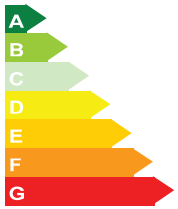
ENVIRONMENTAL ANALYSIS

SBTool CZ is a comprehensive methodology for evaluating the quality of buildings (classification of building´s "sustainability"). It contains less than 50 criteria in three groups (environmental, economic and social). Social criteria in themselves include parameters related to the technical quality of buildings. This methodology is designed to assess buildings for housing and office buildings at the
design / concept and the operational phase.

Methodology SBToolCZ derives from the traditional three areas of sustainable development: environmental, social and economic. The approach is identical to most groovy methodologies used in developed countries. Every building with its surroundings is defined by many characteristics (eg, floor space, energy consumption, availability of services, etc.) and constants (eg, emission factors). These two groups of magnitudes enter into the evaluation algorithm, which is included in the criteria worksheets. Here is the criterion evaluated and scored on the basis of benchmarks (criteria limits), and this is done on the scale from -1 to 5. The value of 5 corresponds to the best available technology (BAT), 3 correspond with current best experience, 0 indicates the normal region and possibly meet the legal requirements and the negative value indicates a condition below the possible boundary that is accepted in a given locality, or it indicates a failure (in many cases not acceptable) of certain requirements, such as breach of standards valid in the region. In this we can see that benchmarks provide a transfer of each criteria value (that is exactly quantifiedor verbally expressed) on the point scale from -1 to 5. The result points of all the criteria are then multiplied by weights, weighted points of each criteria will be summarized and give the overall result.

SBTool is one of the possible ways how to evaluate the sustainability of buildings and can thus determine the potential how to improve and optimize the design of building.

Class of Sustainability	Marks	
	from	to
A	4,5	5,0
B	3,5	4,5
C	2,5	3,5
D	1,5	2,5
E	0,5	1,5
F	-0,5	0,5
G	-1	-0,5

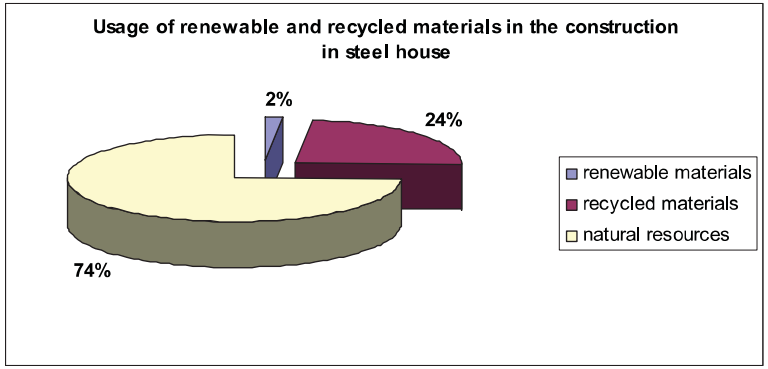


Environment		project	steel		masonry	
Climate change			Marks	Summary of marks	Marks	Summary of marks
	Operating emissions $CO_{2,ekv.}$	12,5%	3,73	0,466	3,74	0,467
	Embodied emissions CO2,ekv.	3,5%	-1,00	-0,035	-1,00	-0,035
Air Quality						
	Operating emissions $SO_{2,ekv.}$	4,6%	4,81	0,219	4,82	0,219
	Operating emissions NO_x	4,6%	4,31	0,196	4,31	0,196
Biodiversity						
	Proportion of area with the original nature character	3,6%	3,08	0,111	3,08	0,111
Usage of resources and waste						
	Annualized non- renewable primary energy used for facility operations	7,7%	3,79	0,291	3,79	0,291
	Annualized non- renewable primary energy embodied in construction materials	3,8%	-1,00	-0,038	-1,00	-0,038
	Usage of renewable and recycled materials in the construction	6,2%	4,00	0,248	3,00	0,186
	Construction waste- during the construction and demolition	3,6%	-1,00	-0,036	-1,00	-0,036
		50,0%		**1,421**		**1,361**
Social aspects						
Health and quality of indoor environment						
	Day lighting	5,2%	5,00	0,260	5,00	0,260
	Acoustic comfort	6,5%	3,00	0,195	3,00	0,195
	Thermal comfort	6,8%	5,00	0,340	5,00	0,340
	Indoor air quality	5,4%	3,00	0,162	3,00	0,162
Availability						
	Access for disabled people	3,3%	3,00	0,099	3,00	0,099
Security						
	Security of building	4,4%	1,00	0,044	1,00	0,044
Adaptability and flexibility						
	Adaptability	3,4%	5,00	0,170	-1,00	-0,034
		35,0%		**1,270**		**1,066**
Economy						
LCC						
	Life cycle cost	5,3%	3,00	0,158	3,00	0,158
Support of local economy						
	Usage of local products	3,6%	0,00	0,000	0,00	0,000
Externalities						
	Innovative approach	2,5%	3,00	0,074	3,00	0,074
	Availability of detailed and operating documentation	1,8%	3,00	0,053	3,00	0,053
Rizika						
	Autonomy of operation	2,0%	0,00	0,000	0,00	0,000
		15,0%		**0,284**		**0,284**
				3,00		**2,70**

Marks

-1	...Inappropriate solutions
0	...Admissible solutions
3	...Good solutions
5	...The best solutions

Usage of renewable and recycled materials in the construction in steel house



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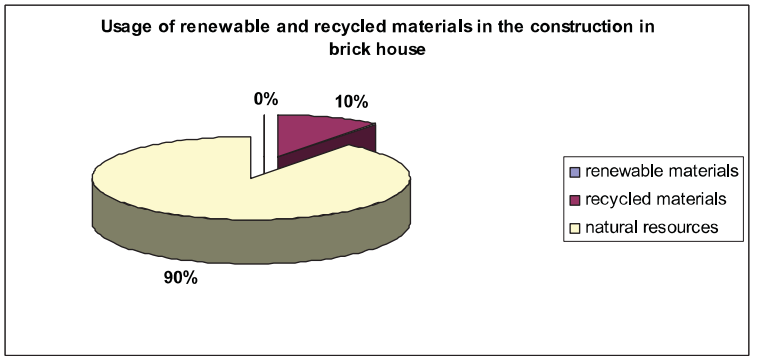
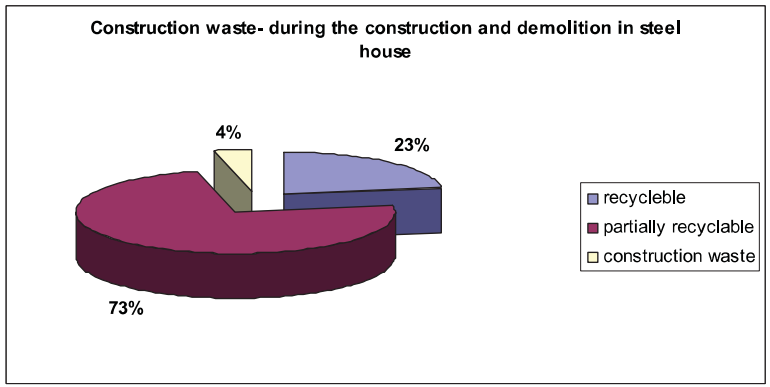
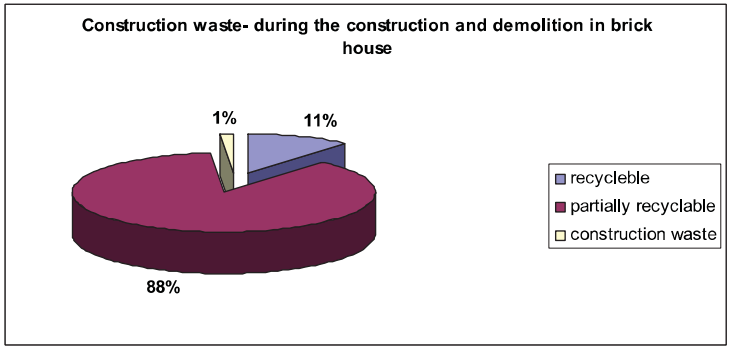


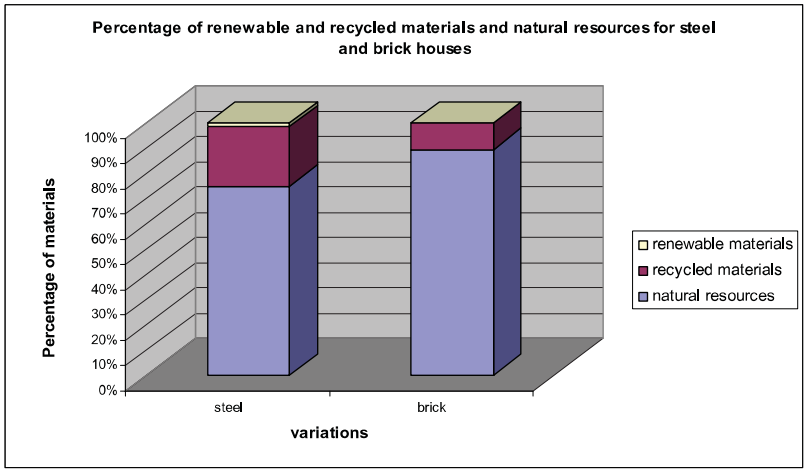
Construction waste- during the construction and demolition in steel house

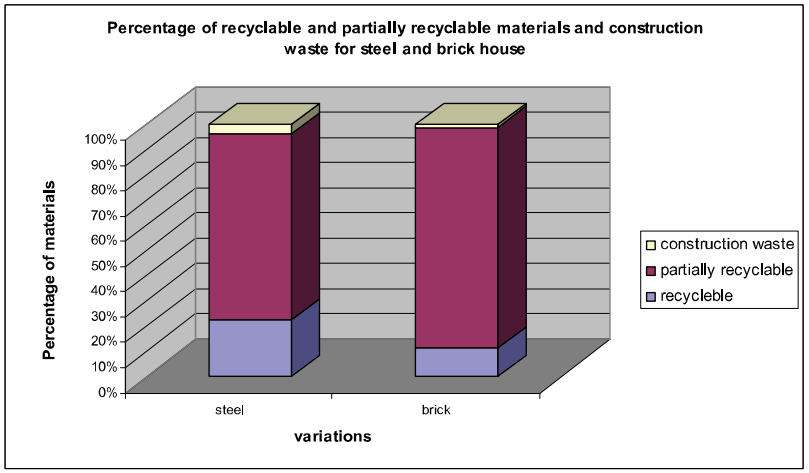


Construction waste- during the construction and demolition in masonry house



Comparison of two construction and material variations





Advantages:

1) low cost housing for wide clientele
2) attractive appearance
3) functionality and variability of the building
4) the house changes and grows according to the social and financial needs of the family
5) it can be built in various areas
6) it can be built as low energetic or passive house
7) If is it passive it can get donations from the government
8) Quick assembling and disassembling
9) Prefab components
10) Can be used recycled steel
11) Most of used materials could be recycled

Disadvantages:

1) not fully traditional material for building houses in the Czech Republic
2) relatively higher cost of delivery on long distances
3) unification (can be both advantage or disadvantage)

Future plans:

1) Completion of construction plans
2) Final solution of problematic details of the structure
3) Overall balance of investments
4) Solving of building services (heating, cooling system; ventilation water distribution etc.)
5) Total usage of materials
6) Evaluation of environmental impacts
7) Analysis of acoustic matters
8) Calculation

THE GROWING STEEL HOUSE TEAM

Teachers / concultations: františek wald - head; karel mikeš – manager; petr hájek - sustainability building concept; jan tywoniak - building energy concept

Students / design: tereza pavlů - structural design, environmental analysis; petr schorsch - structural design; lukáš turek - architectural concept and solution;

Students /collaboration on the text part : petr schorsch - socio-economical evaluation,tomáš horálek - socio-economical evaluation; jakub holeček - socio-economical evaluation; pavel jenýš - traditional housing concept; rostislav mazáč - socio-economical evaluation; zdeňka staňková - traditional housing concept; oldřich švec - socio-economical evaluation; kristina trnková - traditional housing concept; zuzana šulcová - web page;