Evaluation ENERBUILD-Tool – existing buildings

01 Polytechnical School Landeck

1 Basic information about the building

Name of the building	Polytechnical School Landeck
Address of the building	Prandtauerweg 19, 6500 Landeck
Owner/investor	Gemeinde Landeck
Year of construction	2007 - 2008
Building type	massive construction, timber frame construction
Building method	
Number of buildings	1
Number of levels above earth	4
Number of levels underground	1
Kind of the public use	school
Effective area for public use in m ² (net)	3.700 m²
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	3.700 m²
Source of energy for heating	Wood pellets
Heating system	Wood pellet heating
Water heating system	Wood pellet heating
Date of the building evaluation	2011

2 Execution of the building evaluation with the ENERBBUILD tool

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Temperature for thermal comfort in summertime: 26 °C

Local limits for heating demand: 37,05 kWh/m²
(limit OIB RL 6, HWB* new building)

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	62
A	1	Access to public transport network		50	12
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	160
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	15
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	45
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	15
C		Energy & Utilities (Passive house)		max. 350	350
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	41
D		Health and Comfort		max. 250	120
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	30
E		Building materials and construction		max. 200	123
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	123
Sum				max. 1000	815

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally

The evaluation is quite practicable in an adequate working time. Getting all the necessary information and documents is the most difficult part of it. Even if the documents are complete, it is necessary to do interviews with the planner or the owner of the building.

b) About the planning process

To evaluate the planning process it is helpful to do interviews, because written documents don't exist or it is not possible to get them.

c) About the building itself

Doing the evaluation for an existing building is only the second best way. Nevertheless the result of 815 points seems to be realistic for this building.

d) About the evaluation process

Some criteria is quite hard to evaluate. For example the calculation of the mean daylight factor is quite hard to do. It is also very hard, if there is no PHPP-calculation done for the project.
Maybe it would be possible to give some tools with the ENERBUILD-Tool to make the evaluation process easier.

5 Suggestions for improvement of the ENERBUILD-Tool

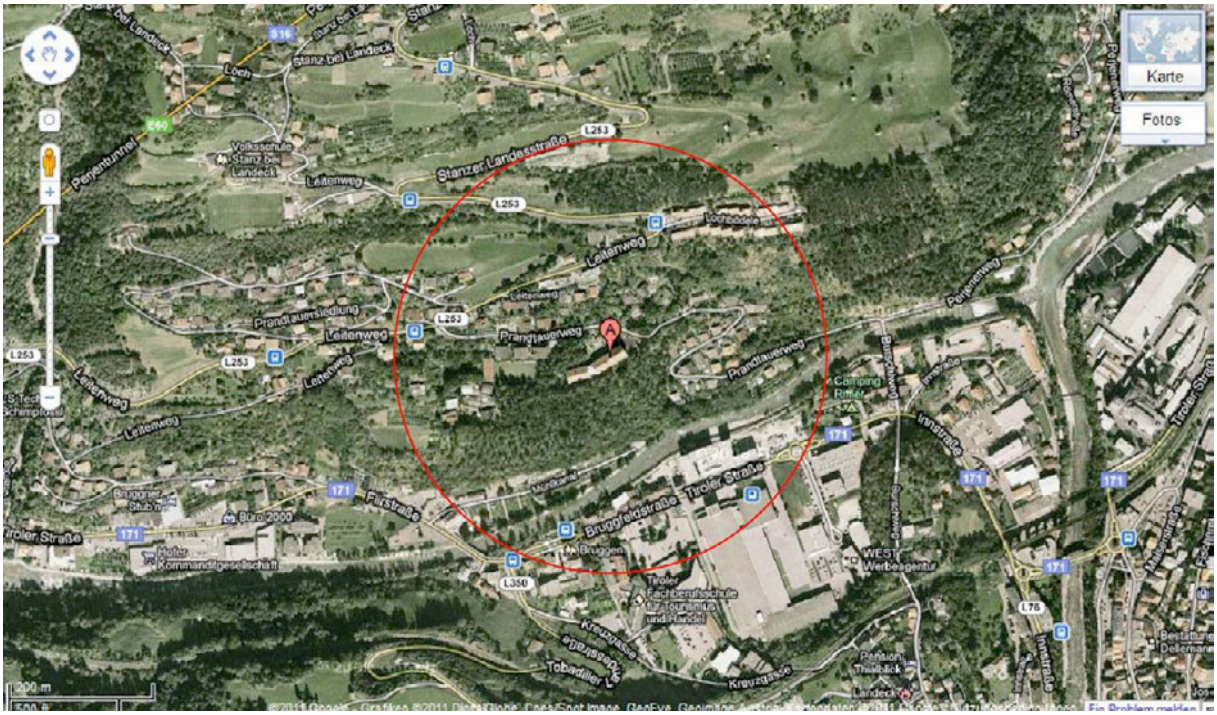
Some additional tools would make it easier to handle the ENERBUILD-tool. At the moment some calculations are very complex. For this reason some architects or planners may be discouraged to do the evaluation. It would also be helpful to do trainings for planners who want to work with the ENERBUILD-tool. Some additional or other criteria for reconstructed buildings should be added.

Detailed evaluation of criteria

A Quality of location and facilities

A 1 Access to public transport network

The public transport was evaluated within the surrounding bus stations in a diameter of 300 meters. There are two bus-stations with an hourly frequency serving the school. There is also a school bus service for the children.



	Points
Access to public transport network	**max. 50**
Points for each bus-station in a radius of 300 m with hourly frequency or shorter frequency	je 6
Points for each bus-station in a radius of 300 m with half-hourly frequency or shorter frequency	je 10
Points for each train-station in a radius of 500 m with hourly frequency or shorter frequency	je 5
Points for each train-station in a radius of 500 m with half-hourly frequency or shorter frequency	je 8

EB-Points	max. Points	**obtained Points**
	50	**12**

A 2 Ecological quality of site

The function of the site was not changed. The ancient school was demolished and the new politechnical school was built on the same surface.

Performance score	Calculated Ecological value of land
-1 - negative	>5
0 - standard	5
3 - good	2.6
5 - excellent	1

EB-Points	max. Points	**obtained Points**
	50	**50**

B Process and planning quality

B 1 Decision making and determination of goals

An architectural competition was carried out and a documentation of the decision making process exists. Different variants have been studied and evaluated in the planning phase.
The 0-variant was evaluated and considered as not relevant.

Criteria	Max. Points	Obtained Points
Exists a documentation of the decision making process?	10	10
Did variants be considered and evaluated?	5	5
Evaluation of the 0-variant	5	5
Exists a documentation of the evaluation scheme of the variants?	4	5
Does it contain:		
Urbanism	2	2
Access to public transport	2	2
Use of area and floor	2	2
Energy efficiency	2	2
Ecological use of materials	2	2

EB-Points	max. Points	**Obtained Points**
	25	**25**

B 2 Formulation of verifiable objectives for energetic and ecological measures

Definition of minimum criteria by fixing some limit values:

- The municipality fixed at the beginning of the planning process a limit for the energy consumption for heating < 25kWh/m²a.
- Later they defined the Passive House limit with 15kWh/m²a as standard for the new school.
- During the planning process the municipality also decided to evaluate the building with the klima:aktiv haus criteria catalogue.
- The air tightness was fixed within the passive house label: n50,lim < 0,6 h(-1).
- Efficiency of the ventilation system: the planner choose a product with a high efficiency. The energy for the ventilation system is supplied with a photovoltaic system.

EB-Points	max. Points	**Obtained Points**
	25	**15**

B 3 Standardized calculation of the economic efficiency

The life cycle costs and the economic efficiency were not calculated in the planning phase.

EB-Points	max. Points	**Obtained Points**
	40	**0**

B 4 Product-management - Use of low-emission products

As the klima:aktiv haus criteria catalogue was used, the planner and the municipality decided from beginning on, that products with low emission should be used (insulation material, floorings, windows).

Criteria	Max. Points	Obtained Points
Exists a documentation of the ecological optimization of the materials during the planning phases?	10	10
The tender for all craftworks have been declared ecologically? 100% of works 90% of works 70% of works	 20 15 10	15
Have all products of all craftworks been declared ecologically? 100% of works 90% of works 70% of works	 30 20 10	10
Does an ecological building supervision exist? Did the supervisor do regularly inspections on the building site? - Total construction process. - Parts of the construction process.	 20 10	10

EB-Points	max. Points	**Obtained Points**
	60	**45**

B 5 Planning support for energetic optimization

The energetically aspects during the planning and construction phase were considered and optimized. The independent institution Energie Tirol supplied the planner and the municipality through the hole project.

Criteria	Max. Points	Obtained Points
Compilation of a space allocation plan	5	5
Roomly distribution of air-flows as calculated in PHPP	5	5
Establishment of internal heat gains	5	5
Consideration of thermal bridges with 0,003 W(m²K)	5	5
Description of energetically requirements (Uw, Ug, g-value, effectiveness heat recovery) in tendering	5	5
Control of energetically aspects in offers	5	5
Support of site manager in energetically aspects with meetings on building site	5	5
Protocol of the initial measurement of the ventilation system	5	5
Protocol of the blower door test	5	5
Protocol of hydraulically adjustment of heating system	5	5
Compilation of energy requirements calculation after the construction phase, blower door test	5	5
Independent evaluation of the energy requirement calculation	5	5

EB-Points	max. Points	**Obtained Points**
	60	**60**

B 6 Information for users

A user manual does not exist for the building. However when the building was delivered an informative meeting was held to inform the teachers and pupil about the use of shadings and window ventilation. Also the caretaker was instructed and he still participates in training to optimize the operation of the building.

EB-Points	max. Points	**Obtained Points**
	25	**15**

C Energy & Utilities

C 1 Specific heating demand (PHPP)

Specific heat demand: 14 kWh/m²a

EB-Points	max. Points	**obtained Points**
	100	**100**

C 2 Specific cooling demand (PHPP)

Specific cooling demand: 0 kWh/m²a

EB-Points	max. Points	**obtained Points**
	100	**100**

C 3 Primary energy demand (PHPP)

Specific primary energy demand: 105 kWh/m²a

EB-Points	max. Points	**obtained Points**
	125	**125**

C 4 CO2-emissions (PHPP)

CO2-emissions: 37 kg/m²a

EB-Points	max. Points	**obtained Points**
	50	**41**

D Health and Comfort

D 1 Thermal comfort in summer

Criteria	Points
Building with less than 35 % Windows surfaces and without active cooling system	
- Analysis based on ON B8110-3	50
- Or analysis OIB RL-6; KB* < 0,4 kWh/m³a	50
- Or analysis OIB RL-6; KB* < 0,6 kWh/m³a	35
- Or Analysis PHPP, Überschreitung 26 °C < 5 %	65
Dynamical building simulation (at least for critical rooms) considerating the local climate, flexible shading systems and the respected usage of the buliding.	
- exceeding 26 °C < 5 % without active cooling system (e.b.free night cooling)	150
- exceeding 26 °C < 10 % without active cooling system (e.b.free night cooling)	50
- exceeding 26 °C < 3 % with active cooling system	75
- Analysis to prevent air currents (v < 0,1 m/s, ΔT < 2 K at the domicile)	75

Relation of opaque and transparent surfaces: 3789 m² of opaque surfaces and 630 m² of transparent surfaces. 14,25 % of the surfaces are transparent, therefore the overheating analysis was made with the non dynamic calculation software PHPP.
The result of the overheating frequency is: 5 %

EB-Points	max. Points	**obtained Points**
	150	**65**

D 2 Ventilation – non energetic aspects

Criteria	Points
Sound transmission calculation (depending on the room use), prognostic of expected sound presser level LA,nT < 30 dB and LC(50-4000),nT < 50 dB	25
Sound emission calculation on most exposed working place LA,nT < 30 dB and LC(50-4000),nT < 50 dB	40
Sound emission calculation on most exposed working place LA,nT < 30 dB und LC(50-4000),nT < 50 dB	50

EB-Points	max. Points	**obtained Points**
	50	**25**

D 3 Daylight optimized (+ lightening optimized)

Result: Mean daylight factor: 3,4%

EB-Points	max. Points	**obtained Points**
	50	**30**

E Building materials and construction

E 1 $OI3_{TGH-Ic}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)

Die Punkte für die Bewertung im Programm ENERBUILD werden mit folgender Formel aus dem $OI3_{TGH-BGF\ WG\ Ref.}$-Wert zwischen 38 und 295 berechnet:

Punkte = 2 * (0,0007 * $OI3_{TGH-BGF_h}$ ² - 0,623 * $OI3_{TGH-BGF_h}$ + 123)

Punkte = 2 * (0,0007 * 113 ² - 0,623 * 113 + 123) = **123 Punkte**

$OI3_{TGH-BGF\ WG\ Ref.}$ –Werte ≤ 38 → 200 Punkte

$OI3_{TGH-BGF\ WG\ Ref.}$ –Werte ≥ 295 → 0 Punkte

EB-Points	max. Points	**obtained Points**
	200	**123**