WP 6 - EFFICIENCY

ENERBUILD Tool: Transnational Pilot Testing on 46 Buildings and Experiences on Advisory Services

ANNEX 2:

Evaluation Reports of 46 public buildings

February 2012

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LP Regional Development Vorarlberg

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(1) LP Regionalentwicklung Vorarlberg: Kindergarten Bizau (finished)

1 Basic information about the building

Name of the building	Kindergarten Bizau
Address of the building	6874 Bizau, Austria
Owner/investor	Municipality of Bizau
Year of construction	2009
Building type	Kindergarten
Building method	Wood construction
Number of buildings	1
Number of levels above earth	2
Number of levels underground	1
Kind of the public use	Kindergarten
Effective area for public use in m ² (net)	440
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	440
Source of energy for heating	Heating oil
Heating system	Teleheating
Water heating system	Teleheating
Date of the building evaluation	-

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Spektrum GmbH, A-6850 Dornbirn, Austria
Contact person: DI Dr. Karl Torghele
Telephone: 0043 5572 208008 Email: karl.torghele@spektrum.co.at

Temperature for thermal comfort in summertime: 53 % > 26 °C
Local limits for heating demand: 19 kWh/m²a

3 Results

Nr.		Title	Must criteria (M); Minimum standard	max. points	Points
A		Quality of location and facilities		max. 100	50
A	1	Access to public transport network		50	20
A	2	Ecological quality of site		50	30
B		Process and planning quality		max. 200	200
B	1	Decision making and determination of goals		25	15
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	35
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	264
C	1	Specific heating demand (PHPP)	M	100	84
C	2	Specific cooling demand (PHPP)	M	100	50
C	3	Primary energy demand (PHPP)	M	125	100
C	4	CO2-emissions (PHPP)		50	30
D		Health and Comfort		max. 250	60
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	10
E		Building materials and construction		max. 200	174
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	174
		Sum		max. 1000	748

Picture interior

Picture interior

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
For rural aeras it is difficult to achieve high score in criteria „A1 - access to public transport network“: Even if the building of interest can be reached frequently but only by one single bus line, only 20 points can be achieved.
In criteria „E1 – Building materials and construction“ the formula for calculation of OI3 needs to be adapted.

b) About the planning process
Although PHPP was calculated there was no Information about PED (Primary Energy Demand) and CO2-emissions available.
The Tool helped in describing the aims of the project. So it helped in the decision making process in the municipality.
The PHPP tool first showed problems is aspects of thermal comfort in summer. It leeds the planning team to improvements of the building envelope and arrangement of windows.

c) About the building itself
The building fulfills the criteria of a nearly zero energy. It is build of timber regional provenience.

d) About the evaluation process
No relevant Problems in the evaluation process because the project was a part of Nachhaltig Bauen in der Gemeinde – a special service for municipalities in developing sustainable buildings.

5 Suggestions for improvement of the ENERBUILD-Tool

1. Reduce Points for access to public transport network – to much weight in rural areas
2. Adaption of Ecosoft 4.0 necessary (in process)
3. Quality Management in calculation of Energy Demand necessary respectively recommended (maybe give points for a QM-System

(2) LP Regionalentwicklung Vorarlberg: Community centre St. Gerold (finished)

Picture outside

Picture outside

Picture outside

1 Basic information about the building

Name of the building	Communal Center St. Gerold
Address of the building	A-6722 St. Gerold, Faschinastraße 84, Austria
Owner/investor	Municipality of St. Gerold
Year of construction	2008/2009
Building type	Communal center
Building method	Wood construction
Number of buildings	1
Number of levels above earth	4
Number of levels underground	0
Kind of the public use	Kindergarten, administration, commerce
Effective area for public use in m ² (net)	527
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	527
Source of energy for heating	Biomass
Heating system	Biomass
Water heating system	Biomass
Date of the building evaluation	-

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Spektrum GmbH, A-6850 Dornbirn, Austria
Contact person: DI Dr. Karl Torghele
Telephone: 0043 5572 208008 Email: karl.torghele@spektrum.co.at

Temperature for thermal comfort in summertime: 0% > 25 °C
Local limits for heating demand: 14 kWh/m²

3 Results

Nr.		Title	Must criteria (M); Minimum standard	max. points	Points
A		Quality of location and facilities		max. 100	47
A	1	Access to public transport network		50	12
A	2	Ecological quality of site		50	35
B		Process and planning quality		max. 200	200
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	35
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
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	50
D		Health and Comfort		max. 250	155
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	40
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	194
E	1	$OI3_{TGH-Ic}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	194
Sum				max. 1000	946

Picture interior

Picture interior

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
From the beginning, this project was planned as a sustainable passive house. Special efforts were made in using regional wood (Weißtanne) and healthy building materials as in the building also a kindergarden is housed.

b) About the planning process
Special efforts in the planning process were necessary to ensure the possibility of using regional available – not industrial produce wood.

c) About the building itself
Except the retaining wall the building is totally constructed of wood. Even the core for the evaluator is made of wood.
The building is certified as an Passivehouse. The Building won several prices as an example for sustainable public buildings.

d) About the evaluation process
No relevant Problems in the evaluation process because the project was a part of Nachhaltig Bauen in der Gemeinde – a special service for municipalities in developing sustainable buildings.

5 Suggestions for improvement of the ENERBUILD-Tool

1. Quality Management in calculation of Energy Demand necessary respectively recommended (maybe give points for a QM-System
2. Reduce Points for access to public transport network – to much weight in rural areas

(3) LP Regionalentwicklung Vorarlberg: Community centre Thüringerberg (finished)

Picture outside

Picture outside

Picture outside

1 Basic information about the building

Name of the building	Kindergarten Thüringerberg
Address of the building	A-6721 Thüringerberg, Jagdbergstraße 273, Austria
Owner/investor	Municipality of Thüringerberg
Year of construction	2010
Building type	Kindergarten, fire station
Building method	Wood construction
Number of buildings	1
Number of levels above earth	2
Number of levels underground	0
Kind of the public use	Kindergarten, fire station
Effective area for public use in m ² (net)	430
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	430
Source of energy for heating	Biomass
Heating system	Teleheating
Water heating system	Teleheating
Date of the building evaluation	-

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Spektrum GmbH, A-6850 Dornbirn, Austria
Contact person: DI Dr. Karl Torghele
Telephone: 0043 5572 208008 Email: karl.torghele@spektrum.co.at

Temperature for thermal comfort in summertime: 0 % > 25 °C
Local limits for heating demand: 14 kWh/m²

3 Results

Nr.		Title	Must criteria (M); Minimum standard	max. points	Points
A		Quality of location and facilities		max. 100	60
A	1	Access to public transport network		50	12
A	2	Ecological quality of site		50	48
B		Process and planning quality		max. 200	180
B	1	Decision making and determination of goals		25	15
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	30
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	30
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	324
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	49
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	105
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	40
D	3	Daylight optimized (+ lightening optimized)		50	0
E		Building materials and construction		max. 200	184
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	184
		Sum		max. 1000	853

Picture interior

Picture interior

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The building combines a kinder garden with a fire department. Therefore it was a challenge to separate the parts in the building with different needs and demands in room temperature and comfort aspects. Also the ecological efforts had to be separated concerning the different parts and usage of the building.

b) About the planning process
The planning process was driven by the idea of life cycle cost efficiency and usage of regional wood.

c) About the building itself
The kinder garden is made of wood and clay. To ensure best indoor air quality was one of the most important aims in the project. The measurements of VOC (< 300 µg/m³) and formaldehyde (< 0,049 µg/m³) showed very good values.

d) About the evaluation process

5 Suggestions for improvement of the ENERBUILD-Tool

Make a suggestion how to deal with different results for indoor air quality in different rooms with different surfaces. How to get the points – is it the average, is it the worst value??

(4) LP Regionalentwicklung Vorarlberg: Social centre Rankweil (finished)

1 Basic information about the building

Name of the building	Social center Klosterreben
Address of the building	A-6830 Rankweil, Klosterreben 4, Austria
Owner/investor	Municipality of Rankweil
Year of construction	In construction
Building type	Social center
Building method	Solid construction
Number of buildings	1
Number of levels above earth	3
Number of levels underground	1
Kind of the public use	Social center
Effective area for public use in m ² (net)	4230
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	4230
Source of energy for heating	Biomass
Heating system	Teleheating
Water heating system	Teleheating
Date of the building evaluation	-

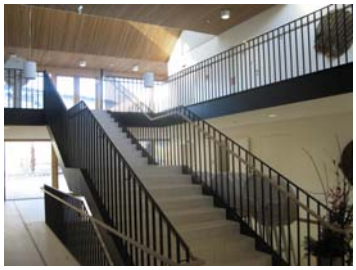
2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Spektrum GmbH, A-6850 Dornbirn, Austria
Contact person: DI Dr. Karl Torghele
Telephone: 0043 5572 208008 Email: karl.torghele@spektrum.co.at

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: (PHPP) 25 kWh/m²

3 Results

Nr.		Title	Must criteria (M); Minimum standard	max. points	Points
A		Quality of location and facilities		max. 100	84
A	1	Access to public transport network		50	48
A	2	Ecological quality of site		50	36
B		Process and planning quality		max. 200	155
B	1	Decision making and determination of goals		25	0
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	30
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	20
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	191
C	1	Specific heating demand (PHPP)	M	100	40
C	2	Specific cooling demand (PHPP)	M	100	73
C	3	Primary energy demand (PHPP)	M	125	68
C	4	CO2-emissions (PHPP)		50	10
D		Health and Comfort		max. 250	115
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	40
D	3	Daylight optimized (+ lightening optimized)		50	10
E		Building materials and construction		max. 200	148
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	148
Sum				max. 1000	693



4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The building first was planned as a regular building according to legal efforts. After internal discussion it was decided to build a “healthy and sustainable” building according to the directives of Nachhaltig Bauen in der Gemeinde.
A process of optimizing the material input, chemical input an reducing energy demand was initiated. As a result of the process the energy demand could be halfed an the input of indoor air pollution could be reduce about 90 %.

b) About the planning process
The beginning wasn´t so perfect, because the optimization in the planning phase started rather late, just after the building application. After starting the ecological planning process, the process runs rather well and the project was optimized in many aspect, especially in energy demand an indoor air pollution.

c) About the building itself
The building is mainly made with concrete and glass. So the primary construction is a “standard-construction”)

5 Suggestions for improvement of the ENERBUILD-Tool

Side sheets for calculation of the Points
Side sheets for further information about the fulfilling of the criteria
How can I find the points in B5?
make a table for finding the points for each subcriteria
D2: error in the formulation of highest quality criteria. It must say

Schallimmissionsmessung am exponiertesten Regelarbeitsplatz $L_{A,nT} < 25$ dB und $L_{C(50\text{-}4000),nT} < 45$ dB	50

(5) PP2 RAEE Lyon: Day-care nursery centre of Comunauté de Communes de la Combe de Savoie et du Gelon Coisin (planning/building phase)

Elevation outside

Elevation outside

1 Basic information about the building

Name of the building	Day-care nursery centre of Comunauté de Communes de la Combe de Savoie et du Gelon Coisin
Address of the building	73250, Saint Jean de la porte, Savoie, France
Owner/investor	Communauté de communes de la Combe de Savoie
Year of construction	2010-2011
Building type	Day-care nursery centre
Building method	Wood frame
Number of buildings	1
Number of levels above earth	1
Number of levels underground	0
Kind of the public use	Day care nursery centre
Effective area for public use in m ² (net)	309
Additional private uses	
Effective area for private use in m ² (net)	
Total effective area in m ²	309
Source of energy for heating	Wood pellets
Heating system	Automatic condensing boiler
Water heating system	Solar thermal
Date of the building evaluation	06/12/2010

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: ASDER (Association de Développement des Energies Renouvelables), Local energy agency
Contact person: Delphine Mugnier - Karine Le Diouron
Telephone: 04 79 85 88 50 Email: delphine.mugnier@asder.asso.fr ; karine.lediouron@asder.asso.fr

Temperature for thermal comfort in summertime: 28 °C
Local limits for heating demand: RT 2005 130 kWh/an/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	25
A	1	Access to public transport network		50	0
A	2	Ecological quality of site		50	25
B		Process and planning quality		max. 200	135
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	30
B	6	Information for users		25	0
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	50
D		Health and Comfort		max. 250	150
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	0
E		Building materials and construction		max. 200	115
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	115
Sum				max. 1000	775

Elevation interior

Floor plan

Floor plan

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The evaluation of this building was facilitated by the fact that this project was the object of an candidacy in the call for projects PREBAT. The documents of the application file allowed to answer criteria to which the statutory documents do not give information.
An approach of good environmental quality since the very beginning of the project made a bvery performing building.

b) About the planning process
From the beginning of the project, the environmental and energy objectives were clearly defined, and in spite of constructive evolutions of the project, the project manager knew how to assure continuity on the follow-up of the objectives of this environmental approach. This process of planning was able to be justified by the precise and complete written documentation realized by the project manager and contracting authority.

c) About the building it
The criteria of the ENERBUILD tool allowed to value the key points of this building: envelop, choice of materials, air quality and the results of the evaluation reflect objectively the global performance of the project.

d) About the evaluation process
Concerning the criterion E1, the evaluation of the energy contents was realized for this building, thus he was able to be valued. However, the approach was rather incited by criteria of financing and we don’t think that this tool allowed an ecological optimization of the construction.
The evaluation of the energy performances (need of heating and need in primary energy from PHPP) is not still adapted to the local regulation tool. Difficulties remain to convert these data to keep a global coherence in the evaluations.
Concerning the criterion D2: we have difficulties to estimate it because of the absence of technical data on the system of ventilation.

5 Suggestions for improvement of the ENERBUILD-Tool

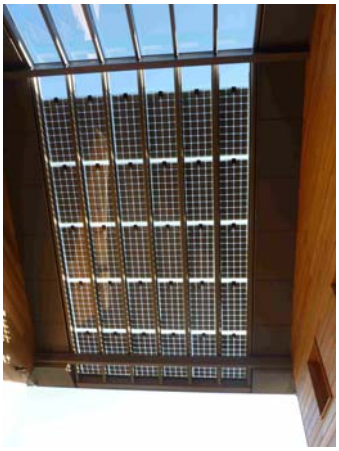
Criterion B5: energy Optimization
To value the energy quality of the building(ship), we propose three options of evaluation; the answers to the following questions ventilate points:

- A document of energy optimization 10 pts
- A planned test for airtightness 20pts
- An instrumentation-monitoring planned 30pts

Criterion D2: ventilation Air quality

- Proposition to decompose this criterion into 2 sub-levels:
- Preservation of the criterion on the acoustic measures by softening and by simplifying the indicator criteria.
- Addition of a line on the quality of the ventilation, according to the activity of the building.
- Proposition to insist more on the evaluation of the air quality by an analysis of the air quality on site for example.

(6) PP2 RAEE Lyon: Ateliers municipaux Bassens, Savoie (finished)



1 Basic information about the building

Name of the building	Ateliers municipaux de la commune de Bassens
Address of the building	Avenue de Mérande 73000 Bassens
Owner/investor	Mairie de Bassens
Year of construction	2009-2010
Building type	Tertiary
Building method	Structure with wood frame and concrete
Number of buildings	2
Number of levels above earth	2
Number of levels underground	0
Kind of the public use	Technical locals
Effective area for public use in m ² (net)	
Additional private uses	
Effective area for private use in m ² (net)	
Total effective area in m ²	345 m²
Source of energy for heating	Gas
Heating system	Heat boiler
Water heating system	Solar thermal with auxiliary gaz
Date of the building evaluation	16/12/2010

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: ASDER (Association Savoyarde de Développement des Energies Renouvelables), local energy agency
Contact person: Delphine Mugnier - Karine Le Diouron
Telephone: 04 79 85 88 50 Email: delphine.mugnier@asder.asso.fr ; karine.lediouron@asder.asso.fr

Temperature for thermal comfort in summertime: 28 °C
Local limits for heating demand: RT 2005 130 kWh/an/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	76
A	1	Access to public transport network		50	26
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	60
B	1	Decision making and determination of goals		25	10
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	10
B	5	Planning support for energetic optimization		60	20
B	6	Information for users		25	0
C		Energy & Utilities (Passive house)		max. 350	321
C	1	Specific heating demand (PHPP)	M	100	46
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	0
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	0
E		Building materials and construction		max. 200	175
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	175
Sum				max. 1000	632

Picture interior

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
Some criterias are difficult to assess. This building is for a technical use, and doesn't fit in very well in these criteria.

b) About the planning process
It can be difficult to get certain documents needed to assess when the project already exists: for example the documents proving the decision-making, determination and definition of the initial objectives (criteria B1 and B2)

c) About the building itself
Cconsumptions' of hot water are considered negligible in this type of commercial building and then entered zero in the calculation regulations. But, on average, each technician takes a shower / day. A solar water heater was even installed only for these needs. The project is therefore advantaged, because of the failure to take account hot water consumption in calculations.

d) About the evaluation process
A tertiary building for technical use doesn't fit easily into the required criteria:
- User Handbook: The project was designed in conjunction with users, according to their requirements.
- Dynamic simulation: its cost is considered too important for the client for its interest in this type of building.
We do not have access to the data requested in the standard D2 Ventilation, air quality inside.

5 Suggestions for improvement of the ENERBUILD-Tool

General Suggestion: Proposal to differentiate criteria depending on the nature of building: social housing building, commercial building, technical building

Criterion A1: Access to public transport network access
Proposal to extend this criterion to other infrastructures valuing friendly transport (cycling and train station in particular).

Criteria B: Project Management
Proposal to add a criterion on water (management, recovery ...).

In this project, all of the following elements could have been valued:

- Recovery of rainwater: a 20 000L storage for water recovery was set up under the pavement of vehicles garage.
- Rain water retention: a retention system has been set up to water rain from the courtyard in accordance with the requirements of Chambéry Métropole (local authority).
- Water Treatment: a water treatment system of the washing area was established in accordance with the requirements of Chambéry Métropole (local authority).

Criterion D2: Ventilation, Indoor Air Quality
Proposal to split the test into 2 sub-levels

- Conservation of the criterion on the acoustic measurements but simplifying the criteria indicators.

- Adding a line on the quality of ventilation (based on the occupation of the building).
- Proposal to focus more on assessing the air quality analysis by an onsite measurement.

(7) PP2 RAEE Lyon: Nursery of Chanéry le Haut (finished)

1 Basic information about the building

Name of the building	Pôle petite enfance Ferme de Julien
Address of the building	195, rue du Grand champ, 73 000 Chambéry, Savoie, France
Owner/investor	City of Chambéry
Year of construction	2010
Building type	Nursery
Building method	System mixed concrete/wood frame
Number of buildings	1
Number of levels above earth	2
Number of levels underground	0
Kind of the public use	
Effective area for public use in m ² (net)	618
Additional private uses	
Effective area for private use in m ² (net)	
Total effective area in m ²	618
Source of energy for heating	Heat network
Heating system	Heat network
Water heating system	Electric boiler
Date of the building evaluation	15-12-2010

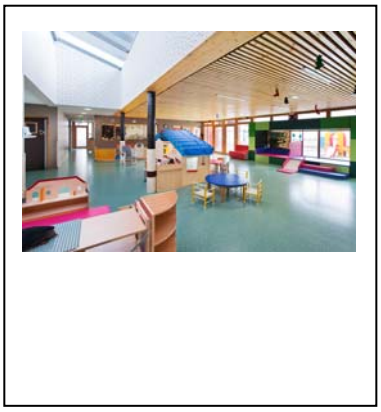
2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: ASDER (Association de Développement des Energies Renouvelables), Local energy agency
Contact person: Delphine Mugnier - Karine Le Diouron
Telephone: 04 79 85 88 50 Email: delphine.mugnier@asder.asso.fr ; karine.lediouron@asder.asso.fr

Temperature for thermal comfort in summertime: 28 °C
Local limits for heating demand: RT 2005 130 kWh/an/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	68
A	1	Access to public transport network		50	18
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	145
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	0
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	0
C		Energy & Utilities (Passive house)		max. 350	128
C	1	Specific heating demand (PHPP)	M	100	0
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	0
C	4	CO2-emissions (PHPP)		50	28
D		Health and Comfort		max. 250	200
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	0
E		Building materials and construction		max. 200	140
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	140
Sum				max. 1000	681



4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
For the evaluation of this project, it was very difficult to get back the data because there was no good coordination between the persons and services which fixed the initial objectives and those who worked with the team the project manager. The building being delivered, it was even more complicated to get back the documents which justify decision-making, determination of the objectives, evolution of the project and solutions.

b) About the planning process
From the beginning of the project, the environmental objectives were clearly defined while the performances were not fixed. The evolution of the statutory context and a motivation of the project ownership and the project manager enabled developing the project towards a construction BBC. This process of planning was difficult to judge due to the lack of precise written documentation.

c) About the building itself
The result of the evaluation is rather coherent with the project and emphasizes the weak points of the project

- Lack of initial precise energy objectives
- The global performances are strongly improved by a renewable electricity production on the site (PV) and by a calculation and a local statutory context because there no maximum deductions of consumptions favored by this electricity production. On this aspect, the evaluation penalizes the project.

d) About the evaluation process
We had no access to the data needed for the criterion D2 (absence of technical data on the system of ventilation).
Concerning the criterion E1, the evaluation of the energy contents of a building is a laborious work, it is difficult to get back the data on materials used with the manufacturers.
The evaluation of the energy performances: need of heating and need in primary energy from PHPP is not still adapted to the local statutory tool. Difficulties remain to convert these data to keep a global coherence in the evaluations.

5 Suggestions for improvement of the ENERBUILD-Tool

Criterion A1: Access to public transport network access
Proposal to extend this criterion to other infrastructures valuing friendly transport (cycling and train station in particular).

Criterion B 4: management of the products of construction
Proposition to value the local origin of materials and to find a simpler tool of evaluation.

Criterion D2: ventilation Air quality

- Proposition to decompose this criterion into 2 sub-levels:
- Preservation of the criterion on the acoustic measures by softening and by simplifying the indicator criteria.
- Addition of a line on the quality of the ventilation, according to the activity of the building.
- Proposition to insist more on the evaluation of the air quality by an analysis of the air quality on site for example.

(8) PP2 RAEE Lyon: Les Jardins d'Eden (finished)

Picture outside

1 Basic information about the building

Name of the building	Les Jardins d'Eden (OPAC) Aix-les-Bains
Address of the building	Rue des Moellerons 73100 AIX LES BAINS, Savoie, France
Owner/investor	OPAC de Savoie (Social housing)
Year of construction	2008-2009
Building type	Social housing
Building method	Concrete with exterior insulation
Number of buildings	1
Number of levels above earth	R+4
Number of levels underground	1
Kind of the public use	44 apartments
Effective area for public use in m ² (net)	
Additional private uses	
Effective area for private use in m ² (net)	
Total effective area in m ²	4 990,38 m²
Source of energy for heating	Gas
Heating system	Collective condensing gas boiler with heating floor
Water heating system	Solar thermal with auxiliary condensing gas boiler
Date of the building evaluation	16/12/2010

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: ASDER (Association de Développement des Energies Renouvelables), Local energy agency
Contact person: Delphine Mugnier - Karine Le Diouron
Telephone: 04 79 85 88 50 Email: delphine.mugnier@asder.asso.fr ; karine.lediouron@asder.asso.fr

Temperature for thermal comfort in summertime: 28 °C
Local limits for heating demand: 50 kWh/m² for heating, hot water, lighting and auxiliaries

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	100
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	110
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	0
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	0
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	243
C	1	Specific heating demand (PHPP)	M	100	76
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	24
C	4	CO2-emissions (PHPP)		50	43
D		Health and Comfort		max. 250	0
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	0
E		Building materials and construction		max. 200	162
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	162
Sum				max. 1000	615

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
Collecting data is the longest phase for the evaluation of the ENERBUILD tool.

b) About the planning process
Evolution positive of the project: a good coordination (listening, discussion, propositions) between the project owner and the team of the project manager enabled the evolution of a "a little bit ambitious" project (the initial objective was only of the THPE (RT2005-20 %) because the program started in 2006 thus at the beginning of the application of the RT2005) towards BBC. There was a strong mobilization of companies working on the construction site and the raising awareness of all the workers to the approach (participation of all the corporate associations during the tests of airthightness: companies showed a real interest noticed by the owner).

c) About the building itself
This project had for objective to reach an energy performance but it did not take into account environmental criteria. So, no natural material except the wood in facade was used for its conception.

d) About the evaluation process
No access to data for criterion D2

5 Suggestions for improvement of the ENERBUILD-Tool

Criterion A1: Access to public transport network access
Proposal to extend this criterion to other infrastructures valuing friendly transport (cycling and train station in particular).
Criteria B: project management
Proposition to consider the social aspect: coeducation of housing, nearness of the businesses or the creation of spaces reserved for the business / service industry aiming, among others, to reduce the environmental impact of the movings, the work in partnership with the municipality for the opening up of the district, on the management of the waste, the integration of the renovation of the school. In this project: integration in a program ANRU (National agency for urban renovation) with general reflection on all these points.

Criterion B5: energy Optimization
Proposition to widen this criterion to the specific electricity. For example, proposition to take into account equipments allowing the reducing of the consumptions of lighting in common sections: lighting by bright button and timer; the number of levels ordered simultaneously does not exceed 3 levels or every floor is independent from the others, above the ground floor. There is also lighting by detector of presence including a crepuscular switch.

Criterion D2: ventilation Air quality

- Proposition to decompose this criterion into 2 sub-levels:
- Preservation of the criterion on the acoustic measures by softening and by simplifying the indicator criteria.
- Addition of a line on the quality of the ventilation, according to the activity of the building.
- Proposition to insist more on the evaluation of the air quality by an analysis of the air quality on site for example.

(9) PP2 RAEE Lyon: Operation Buisson (finished)

Picture outside

Picture outside

Picture outside

1 Basic information about the building

Name of the building	Opération Buisson, 3 Logements sociaux collectifs
Address of the building	70 Impasse des Belledonnes 73000 BASSENS, Savoie, France
Owner/investor	Foncière d'Habitat et Humanisme (Social housing)
Year of construction	2010
Building type	Collective housing
Building method	Wood frame
Number of buildings	1
Number of levels above earth	R+1
Number of levels underground	
Kind of the public use	Social housing for rent
Effective area for public use in m ² (net)	
Additional private uses	
Effective area for private use in m ² (net)	
Total effective area in m ²	193,5
Source of energy for heating	Wood pellets
Heating system	Automatic boiler
Water heating system	Collective solar thermal hot water, auxiliary wood pellets
Date of the building evaluation	05/11/2010

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: ASDER (Association de Développement des Energies Renouvelables), Local energy agency
Contact person: Delphine Mugnier - Karine Le Diouron
Telephone: 04 79 85 88 50 Email: delphine.mugnier@asder.asso.fr ; karine.lediouron@asder.asso.fr

Temperature for thermal comfort in summertime:	28 °C
Local limits for heating demand:	RT 2005 130 kWh/an/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	58
A	1	Access to public transport network		50	20
A	2	Ecological quality of site		50	38
B		Process and planning quality		max. 200	150
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	10
B	5	Planning support for energetic optimization		60	30
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	327
C	1	Specific heating demand (PHPP)	M	100	52
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	150
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	0
E		Building materials and construction		max. 200	140
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	140
Sum				max. 1000	825

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The evaluation with the ENERBUILD tool and the collection of data was facilitated by the labeling process BBC-EFFINERGIE initiated by the owner. Documents necessary for the labeling and for the demands of specific financing allowed to answer criteria to which the statutory document do not give information.

b) About the planning process
The project ownership very motivated by an ambitious project at the energy, environmental and social level favoring a very good coordination with the project manager give at the end a very successful project. Initial objectives were fixed from the beginning of the project. Collective discussions between the Project owner and the team of the project manager during the building process enabled a very good final result, but without written documents of these discussions. The global follow-up of the project by the local energy agency thus allows a better appreciation and facilitate the evaluation.

c) About the building itself
The total of 825 points reflects rather well the global performance of the project, by valuing some weak points concerning the requirements on the criteria of environmental quality.
The criterion B4 was not able to be valued during the test because it is still laborious to get back index forms and data onto materials. And this building consists of ecological materials of construction and insulation, completed by a reflection on the use of local and natural materials. The use of natural materials (construction, insulation, covers) is the result of a voluntary approach, not usual habits. The penalization during the evaluation is simply due to the constraint of the data collection.

d) About the evaluation process

The most difficult part of the evaluation is the one concerning the planning process. It is not still evident to be able to get back documents necessary for this evaluation. The evaluation is facilitated when local energy agency participated in the evolution of the discussions and the decisions and if it is made while the project is in progress.
The evaluation of the energy performances: need of heating and need in primary energy from PHPP is not still adapted to the local statutory tool. Difficulties converting these data to keep a coherence in the evaluations.
Criterion B3: the economic profitability calculation was integrated into an approach of global profitability of this social project. It is so difficult to estimate over-investments connected to the energy efficiency and to the solutions of the variants.
Concerning the criterion D2: we have difficulties to estimate because of the absence of technical data on the system of ventilation.

5 Suggestions for improvement of the ENERBUILD-Tool

Criterion A1: Access to public transport network access
Proposal to extend this criterion to other infrastructures valuing friendly transport (cycling and train station in particular).
Criterion B: project management
Proposition to add an environmental criterion concerning the management of the water.
Criterion B 4: management of the products of construction
Proposition to value the local origin of materials and to find a simpler tool of evaluation.
Criterion C: energy
To value the implementation of equipments using renewable energies sources by the evaluation of a ratio according to the total consumption.
Criterion C2: need of air conditioning
In statics, proposition of 3 options without calculation:
Passive refreshment: 100 pts
Active refreshment: 60 pts
Air conditioning: 10 pts

Criterion C4
Homogenization of the ratios of conversion for CO2 emissions.

Criterion D2: ventilation Air quality

- Proposition to decompose this criterion into 2 sub-levels:
- Preservation of the criterion on the acoustic measures by softening and by simplifying the indicator criteria.
- Addition of a line on the quality of the ventilation, according to the activity of the building.
- Proposition to insist more on the evaluation of the air quality by an analysis of the air quality on site for example.

(10) PP2 RAEE Lyon: Social housing la Terasse (planning/building phase)

1 Basic information about the building

Name of the building	La Petite Chartreuse
Address of the building	243, route de Montabon, 38660 La Terrasse (France)
Owner/investor	PLURALIS
Year of construction	2009
Building type	6 dwellings in social housing
Building method	Wood frame
Number of buildings	2 (4 dwelligs and 2 dwellings)
Number of levels above earth	2
Number of levels underground	0
Kind of the public use	Dwellings
Effective area for public use in m ² (net)	0
Additional private uses	Dwellings
Effective area for private use in m ² (net)	400
Total effective area in m ²	400
Source of energy for heating	Heat pump
Heating system	Hydraulic
Water heating system	Solar thermal and heat pomp
Date of the building evaluation	Decelber 2010

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: AGEDEN (local energy agency of Isère)
Contact person: Benjamin DENHARD
Telephone: 04 76 23 53 50 Email: bdenhard@ageden.org

Temperature for thermal comfort in summertime: 27°C
Local limits for heating demand: 50 kWh/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	86
A	1	Access to public transport network		50	36
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	200
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	25
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	219
C	1	Specific heating demand (PHPP)	M	100	92,5
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	16,5
C	4	CO2-emissions (PHPP)		50	10
D		Health and Comfort		max. 250	50
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	200
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	200
Sum				max. 1000	755

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The time spent to the evaluation is essentially based on the search for information and the adaptation of the criteria to the project. Once the data collected, the evaluation is rather simple and seems good to report the quality of the project.
However, if this tool is interesting, it remains essentially adapted to the projects having turned to the passive approach by PHPP. In an approach other one than PHPP, the adaptations are sources of estimates to suit to the local context and so makes the comparison between European projects delicate even not relevant.

b) About the planning process
The evaluation of the process of planning is not evident because the main criteria is based on the presence or not of "documents" of planning without estimating really the relevance of their contents in the decision-making support and which do not necessarily report "continuous-flow" exchanges realized during the first phases of the project. The presence of an environmental “dashboard” gives a large number of information but is not always realized.

c) About the building itself
The difficulty of the evaluation of the building lies in the necessity of collecting the maximum of information and studies. For this project, the objective of deposit of a file of the Regional Tool facilitated the collection of data. On the other hand, the dynamic thermal simulation was not realized for the summer comfort returning difficult the evaluation of ENERBUILD-Tool. In spite of a Minergie P labelling, the note is rather low, just above the average.

d) About the evaluation process
Some data are complicated to obtain even unsuitable for local different contexts as the indicator D2 on the acoustics of the ventilation. It is not evident to connect the acoustic quality of the ventilation with the quality of internal air. Other difficulties can appear by a cultural approach different from the building as for the indicator E1 because the grey energy is a new notion in France contrary to the other European countries.
A1: data difficult to evaluate and taking a lot of time, to list all the lines, to find schedules for the frequencies, etc.
B1: not very clear
B2 to B5: need to define more exactly the expected documents
C1: conversion from local thermal regulation to PHPP difficult
C3: estimation by ratio of the specific electricity is source of error
D2 and E1: data difficult to obtain

5 Suggestions for improvement of the ENERBUILD-Tool

To improve the ENERBUILD-Tool, it would be good to base on figures common to the European level as the conversion primary energy/ final energy, eqCO2 energies, etc. It is also necessary to first list documents and studies and their specifications indispensable to realize to facilitate the evaluation a posteriori.

(11) PP2 RAEE Lyon: Maison du territoire du vercors (planning/building phase)

1 Basic information about the building

Name of the building	Maison du territoire du Vercors
Address of the building	150, impasse Meillarot 38250 Villard de Lans, France
Owner/investor	Conseil général de l'isère
Year of construction	2011
Building type	Tertiary
Building method	Wood frame
Number of buildings	1
Number of levels above earth	2
Number of levels underground	1
Kind of the public use	offices
Effective area for public use in m ² (net)	911
Additional private uses	1 dwelling
Effective area for private use in m ² (net)	72
Total effective area in m ²	983
Source of energy for heating	Pellets
Heating system	Hydraulic
Water heating system	Solar thermal and wood
Date of the building evaluation	December 2010

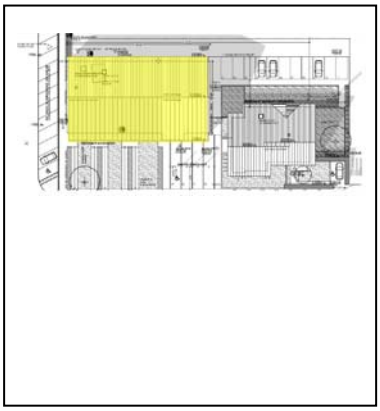
2 Execution of the building evaluation with the ENERBBUILD tool

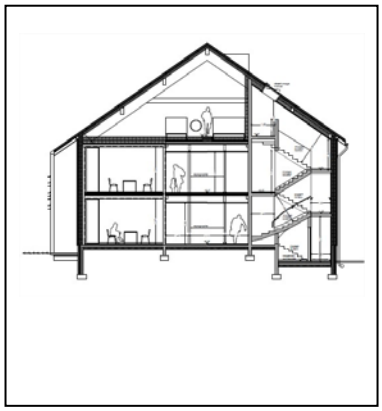
Responsible Organisation: AGEDEN (local energy agency)
Contact person: Benjamin DENHARD
Telephone: 04 76 23 53 50 Email: bdenhard@ageden.org

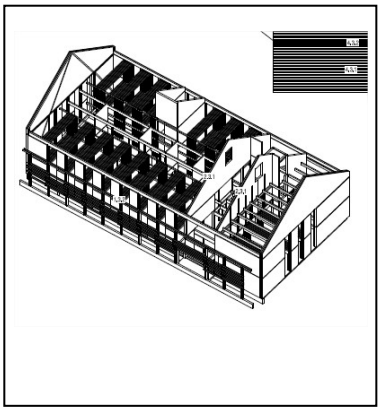
Temperature for thermal comfort in summertime: 27°C
Local limits for heating demand: PHPP 15 kWh/m2.an

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	80
A	1	Access to public transport network		50	30
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	174
B	1	Decision making and determination of goals		25	24
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	30
B	6	Information for users		25	0
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	50
D		Health and Comfort		max. 250	200
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	177
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	177
Sum				max. 1000	981







4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The time spent to the evaluation is essentially based on the search for information and the adaptation of the criteria to the project. Once the data collected, the evaluation is rather simple and seems good to report the quality of the project.
However, if this tool is interesting, it remains essentially adapted to the projects having turned to the passive approach by PHPP. In an approach other one than PHPP, the adaptations are sources of estimates to suit to the local context and so makes the comparison between European projects delicate even not relevant.

b) About the planning process
The evaluation of the process of planning is not evident because the main criteria is based on the presence or not of "documents" of planning without estimating really the relevance of their contents in the decision-making support and which do not necessarily report "continuous-flow" exchanges realized during the first phases of the project. The presence of an environmental “dashboard” gives a large number of information but is not always realized.

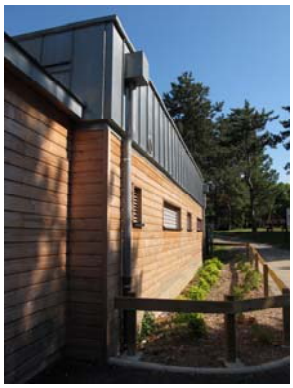
c) About the building itself
The difficulty of the evaluation of the building lies in the necessity of collecting the maximum of information and studies. For this project, the objective of deposit of a file of the Regional Tool facilitated the collection of data. The global number of points represents well the good quality of project.

d) About the evaluation process
Some data are complicated to obtain even unsuitable for local different contexts as the indicator D2 on the acoustics of the ventilation. It is not evident to connect the acoustic quality of the ventilation with the quality of internal air. Other difficulties can appear by a cultural approach different from the building as for the indicator E1 because the grey energy is a new notion in France contrary to the other European countries.
A1: data difficult to evaluate and taking a lot of time, to list all the lines, to find schedules for the frequencies, etc.
B1: not very clear
B2 to B5: need to define more exactly the expected documents
C1: conversion from local thermal regulation to PHPP difficult
C3: estimation by ratio of the specific electricity is source of error
D2 and E1: data difficult to obtain

5 Suggestions for improvement of the ENERBUILD-Tool

To improve the ENERBUILD-Tool, it would be good to base on figures common to the European level as the conversion primary energy/ final energy, eqCO2 energies, etc. It is also necessary to first list documents and studies and their specifications indispensable to realize to facilitate the evaluation a posterior

(12) PP2 RAEE Lyon: Nursery centre Crèche des papillons (finished)



Picture outside

1 Basic information about the building

Name of the building	Crèche des Papillons
Address of the building	10 Allée du Rhin 38130 Echirolles, France
Owner/investor	Ville d'Echirolles
Year of construction	2009
Building type	Nursery
Building method	Wood frame, exterior insulation
Number of buildings	1
Number of levels above earth	1
Number of levels underground	0
Kind of the public use	Nursery for 20 children
Effective area for public use in m ² (net)	210
Additional private uses	0
Effective area for private use in m ² (net)	0
Total effective area in m ²	210
Source of energy for heating	District heating
Heating system	Radiator functioning with hot water
Water heating system	electric
Date of the building evaluation	18/12/2010

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Agence Locale de l'Energie et du Climat de l'agglomération Grenobloise
Contact person: Violaine de Geoffroy
Telephone: 04 76 00 19 09 Email: violaine.degeoffroy@alec-grenoble.org

Temperature for thermal comfort in summertime: 27 °C
Local limits for heating demand: 50 kWh/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	96
A	1	Access to public transport network		50	46
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	90
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	0
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	10
B	5	Planning support for energetic optimization		60	30
B	6	Information for users		25	25
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	50
D		Health and Comfort		max. 250	175
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	0
E		Building materials and construction		max. 200	139
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	139
Sum				max. 1000	850

Picture interior

Picture interior

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
Three stages are necessary for the evaluation of the building: collect the data and the information (written documents and exchange); redefine certain criteria of the assessment grid so that it is more coherent with the available data; complete the assessment grid. The longest part is the collection of the information; it is facilitated in this case because this building was a prize-winner for the call for projects Prebat (data easily available).

b) About the planning process
It seems more difficult to estimate a planning process when the building is already finished, initial objectives were able to evolve in the first phases of the project and the criterion B2 does not report this type of evolution of the objectives. For the evaluation of this planning the expected written documents are not always available

c) About the building itself
On the building, the number of points well reports a successful project on the energy sector (current labeling Passiv' haus) but which is also in phase with environmental considerations on the choices of materials and the management of the construction site.

d) About the evaluation process
For the energy part, the adaptation with the French statutory calculation must be clearly identified because at present only the values stemming from PHPP are considered in this assessment grid. For the criterion D3, it is centered on the acoustics of the installation and does not enough seem to report the quality of the ventilation.

5 Suggestions for improvement of the ENERBUILD-Tool

The ENERBUILD-Tool analyzes well aspects energetics and environmental but the criteria of evaluation are sometimes difficult to understand and require sometimes some adaptation.

(13) PP3 Regione Piemonte: Kindergarten Mazzé (planning/building phase)

1 Basic information about the building

Name of the building	Scuola Materna Comune di Mazzé
Address of the building	Via Castone, Mazzé
Owner/investor	Municipality of Mazzé
Year of construction	2011
Building type	School
Building method	Massive wood structure (XLAM)
Number of buildings	1
Number of levels above earth	1
Number of levels underground	0
Kind of the public use	School
Effective area for public use in m ² (net)	994
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	994
Source of energy for heating	Heat pump
Heating system	Radiant floor
Water heating system	Solar panels
Date of the building evaluation	2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Environment Park
Contact person: Andrea Moro
Telephone: +39 011 2257462 Email: andrea_moro@envipark.com

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: 16,5 kWh/m^3

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	48
A	1	Access to public transport network		50	10
A	2	Ecological quality of site		50	38
B		Process and planning quality		max. 200	190
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	20
B	4	Product-management - Use of low-emission products		60	40
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	94
C	1	Specific heating demand (PHPP)	M	100	30
C	2	Specific cooling demand (PHPP)	M	100	0
C	3	Primary energy demand (PHPP)	M	125	64
C	4	CO2-emissions (PHPP)		50	0
D		Health and Comfort		max. 250	135
D	1	Thermal comfort in summer		150	75
D	2	Ventilation - non energetic aspects		50	30
D	3	Daylight optimized (+ lightening optimized)		50	30
E		Building materials and construction		max. 200	180
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	180
Sum				max. 1000	647

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The main characteristics of the building are the wide use of wood and presence of a large PV installation on the roof. A particular attention has been paid to indoor quality, considering the users of building (children). The energy performance (heating demand) is not elevated because of the almost standard level insulation of the envelop. An improvement of the energetic performance is achieved by means of PV use.

b) About the planning process
The building has been funded by Regione Piemonte trough a specific program for new schools. The funding program was requesting a minimum environmental performance, assessed with the Protocollo ITACA rating system, For this reason in the whole planning process the sustainability issues have been a top issue and the achievement of high performance targets has continuously monitored.

c) About the building itself
The best performance has been reached in the construction materials area. This building is one of the first schools in Regione Piemonte that has been totally constructed in wood.

d) About the evaluation process
The evaluation of the energy criteria has been carried out using a calculation procedure for passive constructions. But because the school has not a “passive” performance, the calculation resulted too much detailed for this kind of construction.

5 Suggestions for improvement of the ENERBUILD-Tool

In the energy criteria and transportation criterion it should be more properly considered the use of the building. For a school the public transportation availability is important only in specific times. The building is not used in summer time and so the cooling energy demand is not fully appropriate.

(14) PP3 Regione Piemonte: Office building PUEEL Torino (planning/building phase)

1 Basic information about the building

Name of the building	PUEEL (Prefabbricato uso Uffici Energeticamente Efficiente in Legno)
Address of the building	Corso Casale 476, Torino
Owner/investor	Regione Piemonte
Year of construction	2011
Building type	Office building
Building method	Wood structure
Number of buildings	1
Number of levels above earth	1
Number of levels underground	
Kind of the public use	Office
Effective area for public use in m ² (net)	150
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	150
Source of energy for heating	Heat pump + PV
Heating system	Radiant floor
Water heating system	Solar panels + Heat pump
Date of the building evaluation	2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Environment Park
Contact person: Andrea Moro
Telephone: 011 2257462 Email: andrea_moro@envipark.com

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: 21,5 kWh/m^3

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	48
A	1	Access to public transport network		50	10
A	2	Ecological quality of site		50	38
B		Process and planning quality		max. 200	180
B	1	Decision making and determination of goals		25	15
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	20
B	4	Product-management - Use of low-emission products		60	40
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	213
C	1	Specific heating demand (PHPP)	M	100	88
C	2	Specific cooling demand (PHPP)	M	100	0
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	0
D		Health and Comfort		max. 250	125
D	1	Thermal comfort in summer		150	75
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	25
E		Building materials and construction		max. 200	180
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	180
Sum				max. 1000	746



4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
PUEEL is a pilot building from the point of view of the energy performance and building materials. The objective was to realize an “active“ building using photovoltaic and thermal solar panels, a strongly insulated envelop and high efficiency technical installations. The whole building is in wood, one of the first office buildings completely realized with renewable materials in the region.

b) About the planning process
The building has been financed by Regione Piemonte thanks to the elevated performance targets fixed for the planning process in the context of a financing program. In all the phases of the building design it has paid the maximum attention to monitor the achievement of the targets, in particular the energy performance and the use of eco-materials.

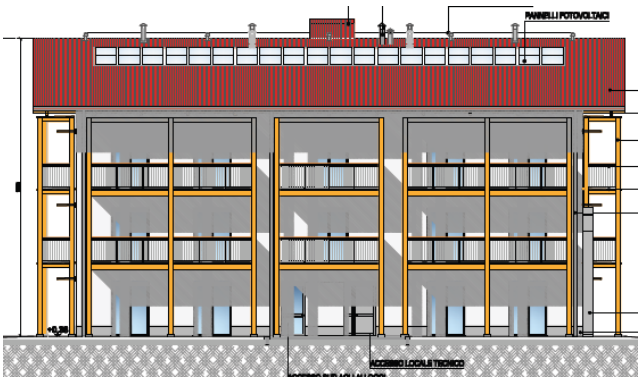
c) About the building itself
The most interesting characteristics of the building are the elevated energy performance and the experimental use of eco-materials. PUEEL means basically “low consumption office building constructed in local wood”. It is one of the first office buildings in Regione Piemonte almost completely realized in wood. The technical installations are quite advanced: all the needed energy, thermal and electric, is produced / compensated by PV panels and solar thermal panels.

d) About the evaluation process
In general, the results of the ENERBUILD Tool assessment reflect the green building strategies implemented in the building. One critical criteria has been the “Specific cooling demand“, because the elevated indoor thermal loads.

5 Suggestions for improvement of the ENERBUILD-Tool

For the energy related criteria ENERBUILD Tool assumes that the assessed building reaches a minimum performance that for a standard building is not usual. If ENERBUILD Tool has to be the base for a building certification system, it should be revised the level of the minimum performance requested.

(15) PP3 Regione Piemonte: Passive house for elderly persons Cirié (planning/building phase)



1 Basic information about the building

Name of the building	Passive House for elderly persons
Address of the building	Strada Case Sparse Battandero, Cirié (Torino, Italia)
Owner/investor	ATC Torino
Year of construction	2012
Building type	Residential
Building method	Concrete structure
Number of buildings	1
Number of levels above earth	3
Number of levels underground	-
Kind of the public use	Residential
Effective area for public use in m ² (net)	754
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	754
Source of energy for heating	Geothermal + Photovoltaic panels
Heating system	Heat pump
Water heating system	Heat pump
Date of the building evaluation	2011

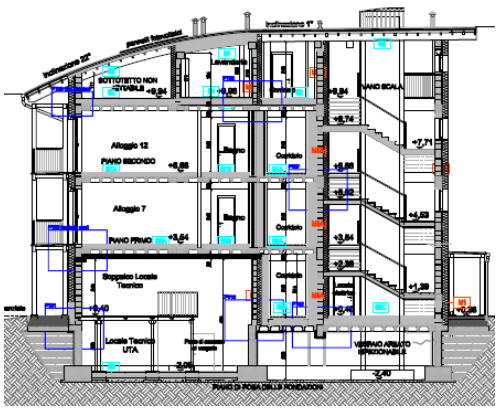
2 Execution of the building evaluation with the ENERBBUILD tool

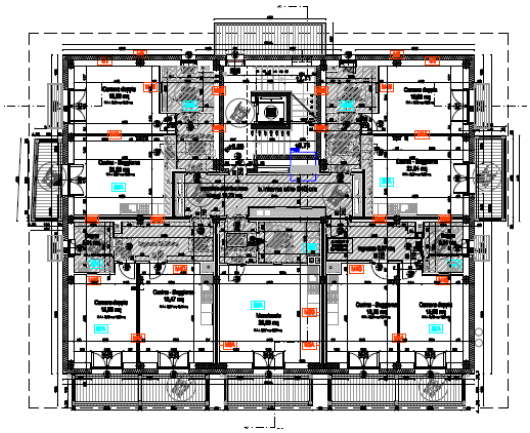
Responsible Organisation: Environment Park
Contact person: Andrea Moro
Telephone: +390112257462 Email: andrea_moro@envipark.com

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: 53 kWh/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	50
A	1	Access to public transport network		50	0
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	189
B	1	Decision making and determination of goals		25	24
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	20
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
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	91
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	85
D	1	Thermal comfort in summer		150	50
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	10
E		Building materials and construction		max. 200	140
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	140
Sum				max. 1000	814





4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
ENERBUILD Tool showed to be an effective evaluation tool, especially applied to low energy buildings located in the alpine space. The results achieved seem to correctly reflect the performance of the assessed building. Its application to “standard practice” buildings could be more critical, considering for instance that all the energy related criteria are calculated using the PHPP software that is specifically targeted to passive houses.

b) About the planning process
The tool has helped during the planning phases to define the performance targets and to monitor their achievement. This aspect has been of importance considering that this building is the first passive house in the field of social housing for the Piedmont Region. The decision process results to be quite difficult to document because it is formulated trough different kind of documents (public acts, meeting minutes, etc.). The LCC analysis has been focused mainly on the cost/benefit analysis for energy consumptions. Product management seems to be critical to handle, due to the scarcity of eco-labels for building products in Italy. A very detailed manual for users has been developed.

c) About the building itself
Half of the score reached by the building is due to its high energy performance. The building materials don’t have a particular ecologic performance. Indoor quality results to be sufficient. Concerning the construction site, no public transportation is available in the range of 300-500 meters while the area is characterized to have a very low ecological value.

d) About the evaluation process
The criteria more challenging are the ones related to the PHPP and OI3 calculations, because it has been necessary to learn the related software. Also the assessment of the criteria linked to the process has been difficult because a structured process/planning because the practice described in ENERBUILD Tool is not standard. But for this reasons, ENERBUILD Tool can contribute effectively to move the standard building practice to better levels.

5 Suggestions for improvement of the ENERBUILD-Tool

If there is the interest to apply the tool also to buildings that don’t have a passive house performance, it would be necessary to revise the energy calculation models. Concerning the OI3 index, it should be addressed the issue to have a EU reference database for building products. Finally, the planning and process criteria should be more deeply described for a more effective application.

(16) PP3 Regione Piemonte: Polo Scolastico Mondovì (planning/building phase)

1 Basic information about the building

Name of the building	Polo Scolastico a Piazza
Address of the building	Piazza d'Armi – Mondovì
Owner/investor	Comune di Mondovì
Year of construction	2012
Building type	School
Building method	Concrete structure
Number of buildings	1
Number of levels above earth	2
Number of levels underground	1
Kind of the public use	School
Effective area for public use in m ² (net)	3397
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	3397
Source of energy for heating	Micro cogeneration and heat pumps
Heating system	Radiant floors and ceilings
Water heating system	Condensation boiler and solar panels
Date of the building evaluation	2011

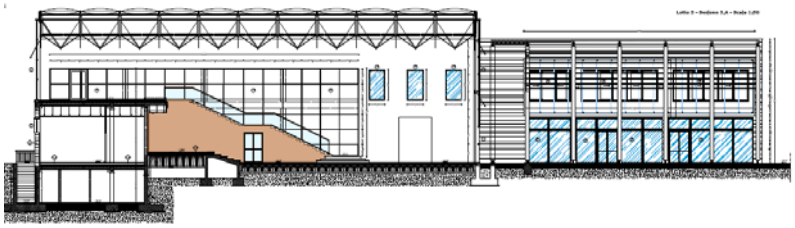
2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Environment Park
Contact person: Andrea Moro
Telephone: +39 0112257462 Email: andrea_moro@envipark.com

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: 72 kWh/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	70
A	1	Access to public transport network		50	20
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	190
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	20
B	4	Product-management - Use of low-emission products		60	40
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	185
C	1	Specific heating demand (PHPP)	M	100	10
C	2	Specific cooling demand (PHPP)	M	100	0
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	150
D	1	Thermal comfort in summer		150	75
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	150
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	150
Sum				max. 1000	745



4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The main strong points of this building are the minimization of energy consumptions and CO_2 emissions and a high indoor environmental quality.

b) About the planning process
This building has been funded through a specific public program for low energy buildings. During the design process both ENERBUILD Tool and Protocollo ITACA have been taken has reference standards. This means that since the early stage of the design process all the environmental performance targets have been fixed and then monitored. A particular attention has been paid to contain the management costs, in particular the energy related ones.

c) About the building itself
A primary objective has been the minimization of energy consumptions and the maximization of renewable energies. For this reason a PV plant combined with a micro-co generator have been installed. An high indoor quality has been reached trough the use of radiant floors and ceilings and the maximization of day lighting. Parts of the construction materials are recycled.

d) About the evaluation process
The strong points of the construction have been appropriately valorized in ENERBUILD Tool.

5 Suggestions for improvement of the ENERBUILD-Tool

The criteria performance scales should reflect in a more appropriate way the use of the building. Also, some criteria should be more coherent with the use. For a school, for instance, the availability of public transportation is important only in specific period of the day.

(17) PP3 Regione Piemonte: Torre Balfredo (planning/building phase)

1 Basic information about the building

Name of the building	Torre Balfredo
Address of the building	Località Torre Balfredo
Owner/investor	ATC Torino
Year of construction	2012
Building type	Residential
Building method	Concrete structure and brick walls
Number of buildings	2
Number of levels above earth	3
Number of levels underground	1
Kind of the public use	Residential
Effective area for public use in m ² (net)	1141
Additional private uses	-
Effective area for private use in m ² (net)	1141
Total effective area in m ²	1141
Source of energy for heating	Condensation Boiler
Heating system	Radiant floor
Water heating system	Solar panels
Date of the building evaluation	2011

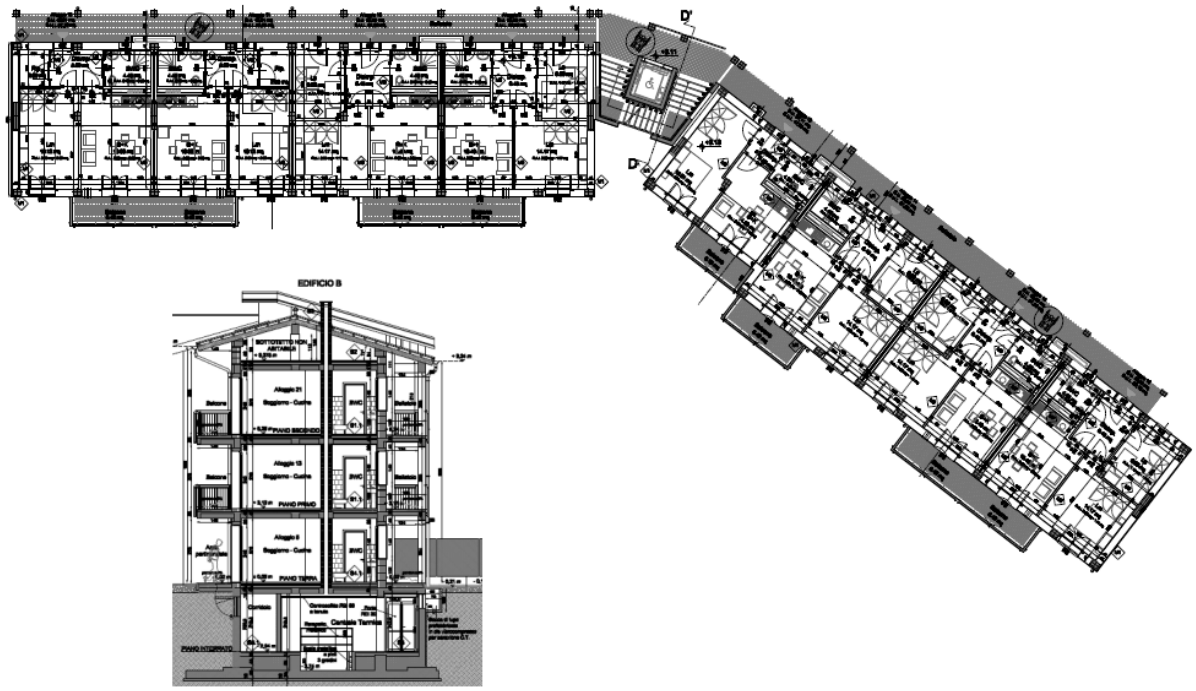
2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Environment Park
Contact person: Andrea Moro
Telephone: 011 22567462 Email: andrea_moro@envipark.com

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: 49,14 kWh/m²

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	48
A	1	Access to public transport network		50	10
A	2	Ecological quality of site		50	38
B		Process and planning quality		max. 200	150
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	20
B	4	Product-management - Use of low-emission products		60	30
B	5	Planning support for energetic optimization		60	30
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	162
C	1	Specific heating demand (PHPP)	M	100	22
C	2	Specific cooling demand (PHPP)	M	100	0
C	3	Primary energy demand (PHPP)	M	125	90
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	85
D	1	Thermal comfort in summer		150	50
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	10
E		Building materials and construction		max. 200	150
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	150
Sum				max. 1000	595



4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
This building can be considered a low consumption construction with regard to the standard practice in social housing. The main characteristics of the building are a low energy demand and the production of renewable energy)PV panels).

b) About the planning process
The building has been funded by Regione Piemonte in the framework of the “10.000 apartments by 2012” program. To obtain the incentive, it was requested by the Region a minimum performance of 2.5 applying Protocollo ITACA. Since the beginning of the design process a strong attention has been paid to the environmental and energy issues. This good performance has been reflected in the score reached in some of the ENERBUILD Tool criteria.

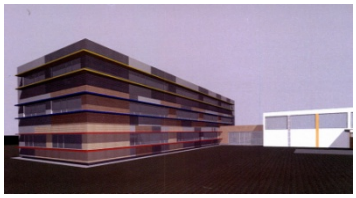
c) About the building itself
The objective of the design was primarily to reduce the energy consumptions. For this reason an high efficiency condensation boiler, PV panels and solar thermal panels have been installed.

d) About the evaluation process
The cross assessment (ENERBUILD Tool / Protocollo ITACA) has facilitated the process. The main issue is the clear scope of ENERBUILD Tool for assessing passive houses while the Protocollo ITACA has a broad scope.

5 Suggestions for improvement of the ENERBUILD-Tool

If the future intent is to use ENERBUILD Tool to assess buildings in regions where the passive house is not a mandatory standard, the main issue is to revise the performance scales of the criteria to allow a more suitable assessment of more conventional construction.
Another issue is to define performance scales based on the different uses of buildings. In particular for energy demands, because consumptions can be very different.

(18) PP6 EAO Styria: Secondary school Weißkirchen (planning/building phase)



1 Basic information about the building

Name of the building	Hauptschule Weißkirchen, Secondary School
Address of the building	Kärntnerstraße 20, A-8741 Weißkirchen
Owner/investor	Gemeinde Weißkirchen, municipality Weißkirchen
Year of construction	Construction 1967, extensive reconstruction 2012
Building type	School
Building method	Lightweight reconstruction on concrete massive construction
Number of buildings	2 : Main building, gym wing
Number of levels above earth	3
Number of levels underground	0
Kind of the public use	Education
Effective area for public use in m ² (net)	1999 (BGF 2352)
Additional private uses	no
Effective area for private use in m ² (net)	0
Total effective area in m ²	1999 (BGF 2352)
Source of energy for heating	Industrial waste heat (District Heating)
Heating system	District Heating Connection, Radiators
Water heating system	Decentral Electric Water Heating
Date of the building evaluation	01.12.2011

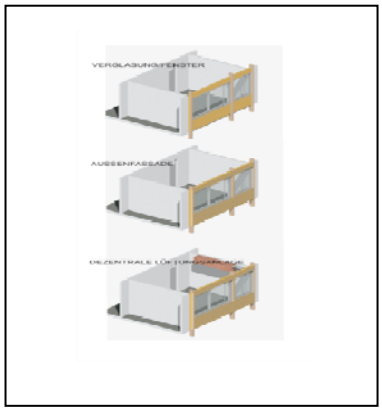
2 Execution of the building evaluation with the ENERBBUILD tool

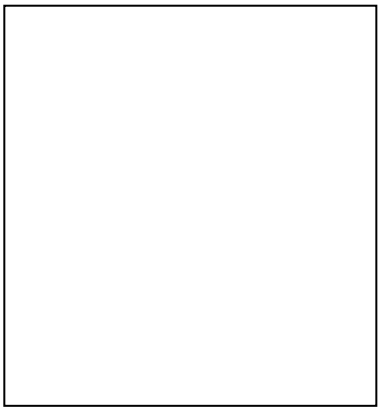
Responsible Organisation: Energieagentur Obersteiermark
Contact person: Josef Bärnthaler
Telephone: +43 3577 26664 Email: office@eao.st

Temperature for thermal comfort in summertime: 26°C
Local limits for heating demand: 65 kWh/m^2 (at the year of construction)

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	86
A	1	Access to public transport network		50	36
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	180
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	316
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	64
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	27
D		Health and Comfort		max. 250	250
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	164
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	164
Sum				max. 1000	996





4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The project aims for a passive house standard in a building that is already due for reconstruction to even keep the secondary modern school operational. The innovative character of the project lies in the application of a prefabricated façade-module made of wood and wooden building material developed in the region in cooperation of the Holzinnovationszentrum, HIZ (Wood Innovation Centre). The module includes thermal insulated façade-, window- and ventilation elements. It is applied in vertical lines up to a height of 12 meters, which leads to a significantly shorter implementation timeframe.

b) About the planning process
In the beginning, there was the choice between two variants of reconstruction. However, the accumulated energy costs and investment costs combined, even the current situation, with 30 % of all windows mechanically defect, would be more favourable from that point of view than the conventional reconstruction. The higher investment in passive house technology would pay itself off by energy savings of 90% of the original energy costs.

c) About the building itself
The secondary modern school of Weißkirchen is an L-shaped, 3-floor building from the seventies. The existent building stock corresponds to the usual standard from then, thus featuring significant bad energy values. With an energy consumption of 154 kWh/m^2/year, the building hits the energy class E. A conventional reconstruction that would only cover the parts that require immediate repair would leave the school building at energy class D. The municipality plan to create a real best practice model.

d) About the evaluation process
The high-value reconstruction includes a ventilation system with heat recovery and daylight management. Additionally, a PV installation is integrated in the façade that adds to the goal of energy self-sufficiency of the building. The ENERBUILD-Tool has proved itself in the evaluation of these features.

5 Suggestions for improvement of the ENERBUILD-Tool

In the project, it has been paid special attention to the use of regional resources and implementing companies from within the region. Short transport ways ensure to minimize the CO_2-output during the reconstruction and the grey energy of the rebuilding. A full life-cycle analysis incorporated in the ENERBUILD-Tool would enable us to integrate this effort in the project.

(19) PP6 EAO Styria: Festival room Eppenstein (finished)

1 Basic information about the building

Name of the building	Dorfsaal Eppenstein
Address of the building	Eppenstein 6, A-8741 Eppenstein
Owner/investor	Gemeinde Eppenstein
Year of construction	2004
Building type	Multipurpose Hall
Building method	Main Building: Wood Construction, Wings: Massive
Number of buildings	3, Main Building, Cross Wing and Intermediate Wing
Number of levels above earth	1
Number of levels underground	1 for Wings
Kind of the public use	Meetings, Seminars, Events
Effective area for public use in m ² (net)	861,47
Additional private uses	can be hired,cooperation with local inn keeper
Effective area for private use in m ² (net)	861,47
Total effective area in m ²	1147
Source of energy for heating	Wooden Biomass
Heating system	District Heating
Water heating system	Decentral Water Heating
Date of the building evaluation	01.12.2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Energieagentur Obersteiermark
Contact person: Josef Bärnthaler
Telephone: +43 3577 26664 Email: office@eao.st

Temperature for thermal comfort in summertime: 26°C
Local limits for heating demand: 65 kWh/m^2 (at the year of construction)

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	168
B	1	Decision making and determination of goals		25	23
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	60
B	5	Planning support for energetic optimization		60	40
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	193
C	1	Specific heating demand (PHPP)	M	100	10
C	2	Specific cooling demand (PHPP)	M	100	37
C	3	Primary energy demand (PHPP)	M	125	101
C	4	CO2-emissions (PHPP)		50	45
D		Health and Comfort		max. 250	235
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	35
E		Building materials and construction		max. 200	181
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	181
Sum				max. 1000	839

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The building of the Dorfsaal (event hall) in Eppenstein was part of a greater reconstruction project that included the village square, the inn and its bowling alley in the basement. The event hall is adjacent to the municipal office building and said inn, the “Eppensteinerhof”. Together, they define the centre of the village.

b) About the planning process
The event hall was planned as multifunctional space that can be used for public events, seminars but also as additional guest room for the adjacent inn. The construction covers an area with a slope of 1.2 meters in northwest direction. The difference in height is negotiated by the use of separate building components. Event hall and village square were designed to fulfil the demand for a village centre.

c) About the building itself
The event hall is divided into three components. The main building is the wood construction of the hall itself. The cross wing is a massive construction that connects to the inn. It is completely built with cellar and contains in the basement the district heating transfer station and the ventilation station with heat recovery system as well as the wine cellar, which was formerly the bowling alley. Between cross wing and main hall stands the intermediate wing that is partially with cellar and emphasizes the separation between the components with glass partitions at the connections.

d) About the evaluation process
The redesign of the village centre in Eppenstein including the erection of a event hall and the creation of a village square has been recognized as a prestigious building project in the municipality. The evaluation of the event hall with the ENEERBUILD-Tool however revealed a great potential for improvements considering Rational Use of Energy (RUE) and Renewable Energy Sources (RES) in planning and construction. The building was planned as a timber construction building, fired by biomass, but the thermal quality of the construction was planned in according to the building-law, but not as a passive house.

5 Suggestions for improvement of the ENERBUILD-Tool

The case of promoting the ENERBUILD-Tool would be effectively supported by info-material with prestigious demonstration buildings that received top values in the evaluation. This goes along with fighting the killer argument of monotonous energy efficient architecture. The impression we want to give is that passive houses and ESAP buildings are prestigious buildings because of their inherent value but also because of their appealing design.

(20) PP6 EAO Styria: Elementary school Scheifling (finished)

1 Basic information about the building

Name of the building	Volksschule Scheifling, Elementary School
Address of the building	Schulgasse 3, A-8811 Scheifling
Owner/investor	Marktgemeinde Scheifling, municipality Scheifling
Year of construction	Construction 1957, extensive reconstruction 2012
Building type	School
Building method	Concrete Massive Construction
Number of buildings	1
Number of levels above earth	3
Number of levels underground	1
Kind of the public use	Education
Effective area for public use in m ² (net)	999
Additional private uses	No
Effective area for private use in m ² (net)	0
Total effective area in m ²	999
Source of energy for heating	Wood Chips (from Biomass District Heating)
Heating system	District Heating Connection, Radiators
Water heating system	Decentral Electric Water Heating
Date of the building evaluation	01.12.2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Energieagentur Obersteiermark
Contact person: Josef Bärnthaler
Telephone: +43 3577 26664 Email: office@eao.st

Temperature for thermal comfort in summertime: 26°C
Local limits for heating demand: 65 kWh/m^2 (at the year of construction)

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	100
A	1	Access to public transport network		50	50
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	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	40
B	5	Planning support for energetic optimization		60	50
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	209
C	1	Specific heating demand (PHPP)	M	100	91
C	2	Specific cooling demand (PHPP)	M	100	28
C	3	Primary energy demand (PHPP)	M	125	76
C	4	CO2-emissions (PHPP)		50	14
D		Health and Comfort		max. 250	250
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	156
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	156
Sum				max. 1000	875

Picture interior	Picture interior	Picture interior

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The elementary school Scheifling, particularly the main building called “alte Hauptschule” (old Secondary School) has been erected in the year 1957 and is due for renovation. The goal is to include with the necessary repair works also the improvement of the school from an energetic point of view. The current energy class is D on the verge of E with energy consumption of 148.6 kWh/m^2/year.

b) About the planning process
In the course of the refurbishment of the school, it is planned to decrease the energy demand of the building significantly near to passivhaus standard by the application of thermal insulation of the building envelope and the top ceiling as well as the installation of a PV-plant of 20 kWp on the roof. Further improvements, additional to these core efforts, will be implemented according to the effective amount of acquired subsidies.

c) About the building itself
The building has always been used for education purposes. It served as secondary school before becoming the accommodation of the elementary school and is still called this way, “alte Hauptschule”. The building is oriented for maximum daylight use and well suited for a photovoltaic plant on the roof. As a result, the window shading plays an important role for heat and daylight management.

d) About the evaluation process
The evaluation of the building both in current and as planned condition with the ENERBUILD-Tool emphasizes the importance not only of sustainable energy measures but an energy aware course of action in the life cycle of a building, planning, construction, use and demolition, as a whole. The evaluation procedure successfully highlighted the conditions and implications of successfull thermal insulation.

5 Suggestions for improvement of the ENERBUILD-Tool

In the planning phase, the ENERBUILD-Tool is used as mean for pointing out options and consequences of building and reconstruction solutions. This valuable function could be improved in its effect with a graphical depiction of result and conclusions. Customers are already used to the energy classes and respond very well to simple yet informative illustrations.

(21) PP6 EAO Styria: Innovation Centre Zeltweg (finished)

1 Basic information about the building

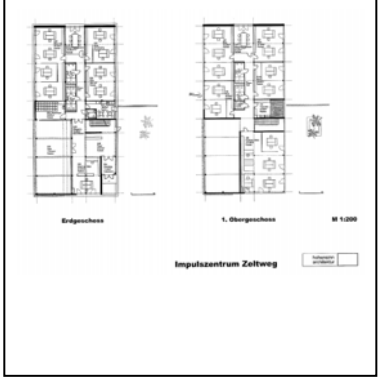
Name of the building	Impuls- und Technologiezentrum, ITZ (Impulse and technology center)
Address of the building	Holzinnovationszentrum 1a, A-8740 Zeltweg
Owner/investor	Innofinanz- Research and Development Aid of Styria
Year of construction	2007
Building type	Office Building
Building method	Lightweight Construction; Wood, Glass, Steel, Concrete
Number of buildings	1
Number of levels above earth	2
Number of levels underground	1
Kind of the public use	Aggregation of Wood-Related Organizations for the Creation of Regional Added-Value and Promotion of Wood
Effective area for public use in m ² (net)	782
Additional private uses	Seminar Rooms for Rent
Effective area for private use in m ² (net)	282
Total effective area in m ²	1064
Source of energy for heating	Wood Chips (from Biomass CHP nearby)
Heating system	District Heating Connection; Radiators
Water heating system	Decentral Electric Water Heating
Date of the building evaluation	30.11.2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Energieagentur Obersteiermark
Contact person: Josef Bärnthaler
Telephone: +43 3577 26664 Email: offic@eao.st

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	50
A	1	Access to public transport network		50	0
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	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	40
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	50
C	1	Specific heating demand (PHPP)	M	100	
C	2	Specific cooling demand (PHPP)	M	100	
C	3	Primary energy demand (PHPP)	M	125	
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	250
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	185
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	185
Sum				max. 1000	695



4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The building Impuls- und Technologiezentrum, ITZ (Impulse and Technology Centre) is part of the location Holzinnovationszentrum, HIZ (Wood Innovation Centre). While most buildings at the cluster are reserved for one specific company, the ITZ is the host of a great variety of organizations and activities.

b) About the planning process
The aspects considered in the planning process focused on the multifunctionality of the building for its use as an impulse centre. The rooms were designed to be used for meetings, seminars and office routine requirements. The timber construction puts the emphasis on the focus on the use of regional available resources as fitting to the location, the Holzinnovationszentrum (Wood Innovation Centre), HIZ.

c) About the building itself
The ITZ building was originally not designed according to passive house principles. However, the construction met the requirements for a low energy building in the year of its erection. The improvements according to ESAP-building technology were added later on behalf of the initiatives of the renting companies, particularly the EAO. As a result of these efforts, the building is connected to the district heating grid of the neighbouring biomass CHP, features a solar cooling facility and an improved shading system.

d) About the evaluation process
In terms of energy efficiency and use of renewable resources, the ITZ has been greatly improved in the few years since its erection. However, these improvements couldn't be incorporated in the evaluation equivalent to measures planned from the start.

5 Suggestions for improvement of the ENERBUILD-Tool

For the application of a district heating connection there are only the options of fossil fuelled heat sources in the PHPP, but no consideration for a biomass CHP, as in case of the ITZ. However, biomass district heating is in some regions a rather popular technology and should be incorporated in the ENERBUILD evaluation procedure.
Even though there is plenty of consideration on the planning process, the possibility for improvements during the use of the building has been completely neglected. There should be at least an option for the recording of later added technology, even in regards to the focus being on new constructions.

(22) PP6 EAO Styria: School Centre Neumarkt (finished)

1 Basic information about the building

Name of the building	Schulzentrum Naturpark Zirbitzkogel-Grebenzen
Address of the building	Europaplatz 1, A-8820 Neumarkt
Owner/investor	Marktgemeinde Neumarkt in Steiermark Schulerrichtungs- u. Sanierungs KG
Year of construction	Construction: 1970's , reconstruction: 2010
Building type	Secondary School
Building method	Stock: Skeleton Structure, Reconstruction: Wood, light
Number of buildings	4 total, 2 are reconstructed, C: secondary school 2, D: gym floor /multipurpose hall
Number of levels above earth	C: 3, D: 2
Number of levels underground	C: 1, D 1
Kind of the public use	Education
Effective area for public use in m ² (net)	2422,5 (BGF 2850)
Additional private uses	no
Effective area for private use in m ² (net)	0
Total effective area in m ²	2422,5
Source of energy for heating	Biomass
Heating system	Biomass district heating, Ventilation system with heat recovery
Water heating system	Decentral Electric Water Heating
Date of the building evaluation	01.12.2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Energieagentur Obersteiermark
Contact person: Josef Bärnthaler
Telephone: +43 3577 2664 Email: office@eao.st

Temperature for thermal comfort in summertime: 26°C
Local limits for heating demand: 65 kWh/m^2 (at the year of construction)

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	100
A	1	Access to public transport network		50	50
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	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	30
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	314
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	55
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	34
D		Health and Comfort		max. 250	250
D	1	Thermal comfort in summer		150	150
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	175
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	175
Sum				max. 1000	999

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The secondary modern school was already analysed by the EAO in the year 2000 for thermal reconstruction. Based on these results, the municipality planned an extensive reconstruction and founded 2008 a limited partnership with various building experts for implementation.

b) About the planning process
The planning was done by a team of experts (ARCH+MORE ZT GmbH, Arch. DI Gerhard Kopeinig), specialised respectively in passiv haus planning, building management, building physics, statics, electrical engineering, HVAC and building coordination. All building plans and structural views have been published since the beginning of the project on the website: http://www.schule-im-naturpark.at/praesentation/praesentation.htm

c) About the building itself
The school centre consists of 4 buildings from the years 1975 and 1976. In the buildings A and B, only moisture damages have been repaired, as well as some slight, safety-related reconstruction. However, the buildings B and D have been completely remodelled according to passive house standards, making the first passive house school in Styria.

d) About the evaluation process
The reconstructed school in Neumarkt is the building most fitting for the requirements of the ENERBUILD-Tool in our region. The efforts in meticulous planning and construction produced great results in the evaluation. The project deserves to be recognized as best practice example for public buildings in Murtal.

5 Suggestions for improvement of the ENERBUILD-Tool

With regard to successful projects like the reconstruction of the school centre in Neumarkt, it would be good to be able to refer to such best practice examples as a way to promote the further use of the ENERBUILD-Tool. A representation of different public buildings could be incorporated in training materials for the use of the ENERBUILD-Tool in order to:
Demonstrate the feasibility of the tool in practice
Show the function of the tool in real-life examples as introductory exercise

(23) PP7 TZS Tirol: Secondary school Zams (finished)

1 Basic information about the building

Name of the building	Secondary School Zams (refurbishment)
Address of the building	Oberreitweg 26, 6511 Zams
Owner/investor	Gemeinde Zams
Year of construction	2007 - 2008
Building type	massive construction, timber frame construction
Building method	
Number of buildings	1
Number of levels above earth	3
Number of levels underground	1
Kind of the public use	school
Effective area for public use in m ² (net)	5.506 m²
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	5.506 m²
Source of energy for heating	oil
Heating system	Oil fired heating (existing heating)
Water heating system	Oil fired heating
Date of the building evaluation	2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Energie Tirol, Südtiroler Platz 4, 6020 Innsbruck
Contact person: DI Matthias Wegscheider
Telephone: +43-512-589913-13 Email: matthias.wegscheider@aon.at

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: 46,88 kWh/m²
(limit OIB RL 6, HWB*
umfassende Sanierung)

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	50
A	1	Access to public transport network		50	0
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	133
B	1	Decision making and determination of goals		25	18
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	10
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	40
B	5	Planning support for energetic optimization		60	50
B	6	Information for users		25	15
C		Energy & Utilities (Passive house)		max. 350	194
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	37
C	3	Primary energy demand (PHPP)	M	125	47
C	4	CO2-emissions (PHPP)		50	10
D		Health and Comfort		max. 250	105
D	1	Thermal comfort in summer		150	50
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	30
E		Building materials and construction		max. 200	77
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	77
Sum				max. 1000	559

before reconstruction

after reconstruction

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
As this project is a reconstruction some of the criteria were hard to handle. Therefore the result of 559 points seems to be realistic. There should be a bonus for reconstructions (of course only when they make sense).

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.

(24) PP7 TZS Tirol: Medical Centre Ried im Oberinntal (finished)

1 Basic information about the building

Name of the building	Medical Center Ried im Oberinntal
Address of the building	Hauptstraße 51, 6531 Ried im Oberinntal
Owner/investor	-
Year of construction	2009-2010
Building type	massive construction (refurbishment), solid wood construction (new)
Building method	
Number of buildings	2 (existing + new)
Number of levels above earth	3 (ground, second, attic floor)
Number of levels underground	1
Kind of the public use	Medical center
Effective area for public use in m ² (net)	498 m²
Additional private uses	Residential use
Effective area for private use in m ² (net)	238 m²
Total effective area in m ²	736 m²
Source of energy for heating	Electric energy and ground water
Heating system	Ground water heat pump
Water heating system	Ground water heat pump
Date of the building evaluation	2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Energie Tirol, Südtiroler Platz 4, 6020 Innsbruck
Contact person: DI Matthias Wegscheider
Telephone: +43-512-589913-13 Email: matthias.wegscheider@aon.at

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: 50,00 kWh/m² (limit reconstruction)
40,85 kWh/m² (limit new building)

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	56
A	1	Access to public transport network		50	6
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	130
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	25
B	5	Planning support for energetic optimization		60	55
B	6	Information for users		25	10
C		Energy & Utilities (Passive house)		max. 350	137
C	1	Specific heating demand (PHPP)	M	100	82
C	2	Specific cooling demand (PHPP)	M	100	55
C	3	Primary energy demand (PHPP)	M	125	0
C	4	CO2-emissions (PHPP)		50	0
D		Health and Comfort		max. 250	100
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	10
E		Building materials and construction		max. 200	102
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	102
Sum				max. 1000	525

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
As this project is a reconstruction some of the criteria were hard to handle. Therefore the result of 525 points seems to be realistic. There should be a bonus for reconstructions, especially when there is such a successful transformation of a historical 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.

(25) PP7 TZS Tirol: Polytechnical school Landeck (finished)

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

Responsible Organisation: Energie Tirol, Südtiroler Platz 4, 6020 Innsbruck
Contact person: DI Matthias Wegscheider
Telephone: +43-512-589913-13 Email: matthias.wegscheider@aon.at

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.

(26) PP7 TZS Tirol: Kindergarten Kramsach (finished)

1 Basic information about the building

Name of the building	Kindergarten Kramsach
Address of the building	Oberreitweg 26, 6511 Zams
Owner/investor	Gemeinde Kramsach
Year of construction	2007 - 2008
Building type	massive construction, timber frame construction
Building method	
Number of buildings	1
Number of levels above earth	2
Number of levels underground	0
Kind of the public use	Kindergarten
Effective area for public use in m ² (net)	1.106 m²
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	1.106 m²
Source of energy for heating	Natural gas
Heating system	Natural gas heating (existing system)
Water heating system	Natural gas heating
Date of the building evaluation	2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Energie Tirol, Südtiroler Platz 4, 6020 Innsbruck
Contact person: DI Matthias Wegscheider
Telephone: +43-512-589913-13 Email: matthias.wegscheider@aon.at

Temperature for thermal comfort in summertime: 26 °C

Local limits for heating demand: 44,65 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	130
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	10
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	25
B	5	Planning support for energetic optimization		60	55
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	37
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	42
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	42
Sum				max. 1000	704

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 704 points seems to be realistic for this building.
At the moment the passive house certification is in progress.

d) About the evaluation process
Some criteria is quite hard to evaluate. 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.

(27) PP8 Provincia Autonoma die Trento: School in Romarzollo (planning/building phase)

Picture outside

Picture outside

Picture outside

1 Basic information about the building

Name of the building	Romarzollo School
Address of the building	Via Carducci, 38062 Romarzollo di Arco (Tn), Italy
Owner/investor	Municipality of Arco
Year of construction	20010-2011
Building type	Massive construction
Building method	Concrete walls with external insulation
Number of buildings	1
Number of levels above earth	3
Number of levels underground	1
Kind of the public use	School
Effective area for public use in m² (net)	1780.1 m^2
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m²	1780.1 m^2
Source of energy for heating	*Natural* gas
Heating system	*Central-heating boiler powered by natural* gas
Water heating system	*Central-heating boiler powered by natural* gas
Date of the building evaluation	In progress

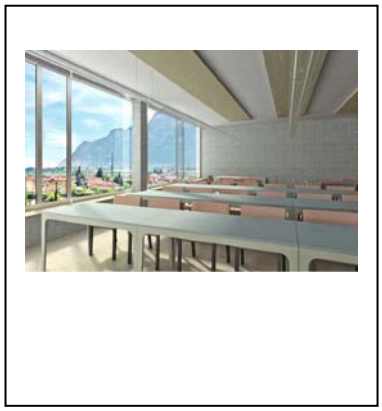
2 Execution of the building evaluation with the ENERBUILD tool

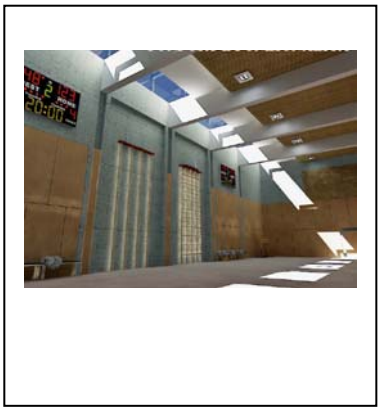
Responsible Organisation: University of Trento – Department of Civil and Environmental Engineering - Italy
Contact person: Prof. Antonio Frattari
Telephone: +390461282668 Email: antonio.frattari@unitn.it

Temperature for thermal comfort in summertime: 27 °C

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	88
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	38
B		Process and planning quality		max. 200	170
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	35
B	6	Information for users		25	0
C		Energy & Utilities (Passive house)		max. 350	303
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	28
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	0
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	0
E		Building materials and construction		max. 200	0
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	0
Sum				max. 1000	561





4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally

The building scored 561 points: the score is not high although its level of environmental sustainability is quite good. In particular, the project doesn't get any score in section "Health and Comfort". In particular:

1. For what concerns the criterion "optimized Daylight", LEED do not consider acoustic criteria, so no calculus is available at the moment on this issue.
2. Regarding "Thermal comfort in summer", even if T upper limit has been raised to 27°C (in order to consider higher summer temperature in Italian situation), the upper allowed temperature is overshoot for the 36.4 % of time. This is probably due to the fact that schools are not used from middle June to middle September, so not enough attention has been put to summer overheating. Besides, in Mediterranean countries it is quite difficult that upper temperature is overshoot less than 5% of time in summer, so this limit should be raised. In school, only effectively period of use should be considered.
3. Considering "Daylight optimized", Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area, that is effectively a too severe request.
   Besides, no points are obtained in section E "Building materials and construction" being the OI3 index too high due to the wide use of concrete in the construction.

b) About the planning process

The building was designed to obtain a Leed NC 2.2 Gold certification, corresponding to a score of 44-57 points.
For what concerns the planning process, it has been done using LEED as reference and not ENERBUILD tool, that has been applied in a second moment and so it can be considered more an evaluation tool than a planning tool. However, the following considerations about ENERBUILD-Tool can be done:

1. Point A1 is clear and easy to be faced.
2. Point A2 is well defined and the proposed index is easy to be used.
3. Points B1 and B2 are very detailed and well done. All the most important aspects of planning phase are taken into consideration. Each point has a proper reference with LEED tool (see even following detailed considerations).
4. Point B3 has been quite difficult to be done. LCC is a procedure more and more important in the planning phase (together with LCA) and it is important that in ENERBUILD it has a good relevance, but the ISO Standard and the Austrian

standard has been difficult to be applied. For this reason, a simplified method has been followed considering the classical value analysis theory.

5. Point B4 is very important concerning human health in indoor spaces. ENERBUILD is quite complete even if the definition of the percentage of structures with ecological declaration is not clear. It could be easier to have reference to European standards and not to local ones. Even a list of most common building components could be useful.
6. Point B5 is of course an important issue and it has clear reference, point by point, with LEED protocol. It is sufficiently clear and not difficult to be faced.
7. Point B6 is clear and very important. Unfortunately, not all the energy and environmental tools consider this aspect.
8. Point C1 to C4. This is the most problematic section of the tool. In fact, we agree that, in order to have comparable results, the same energy calculation tool should be used. However, PHPP is a good tool only if a passive building has been designed, and the pilot building considered is not a passive one. Moreover, cooling demand is often overestimated and low points are given. It is our opinion that other software should be used, even national ones, taking into account that all the partners should agree on some “fixed points” so that final results of the energy calculation could be compared. For example, it is important to consider international standards. But the choice of the energy calculation tool should be free.
9. Point D1: refer to previous comment.
10. Point D2: in this case, it should be better to leave the partner free to consider national legislation and not fixed values. Also the acoustic index used should refer to international standards. In the case of the pilot building considered, calculation were not made so it is quite impossible to calculate the correct indexes.
11. Point D3: the point is simple and using the EN standard it is easy to calculate. Anyway, the 5% of DF required seems to be too high. In our opinion, following LEED specifications, a daylight factor up to a maximum percentage of 2% in 75% of frequently used spaces should be sufficient.

Point E1: the procedure for calculating the OI3 index is quite simple and it is an important aspects of building construction.

c) About the building itself

The Municipality of Arco has planned the construction of a new elementary school in the locality Romarzollo to satisfy the educational needs of neighboring villages. The area is included in the instrumentation planning purposes "on public services" and it is a quiet area flanked by a sport center and well connected by roads and public services.
The new school will house 300 students and will consist of 14 classrooms and laboratories, a gymnasium, a canteen with related services, storage spaces and outdoor spaces.
The new building fits in an environmental context and landscape of valuable features, which
have influenced the project architectural formal-choices. Especially on its north side landscape is strongly marked by characteristic "terracing" form of cultivated land that mark the hills.
The design of the new school try to integrate with existing landscape. The building is designed by parties and volumes buried and above ground, the flat roofs of buried shares become walking plans which integrate in the landscape. The visible part of the building has a very regular shape with the purpose to become a strong element of recognition.
Choices have been made also with the intent to offer users the best conditions of comfort (lighting environments, strong contact with the external environment, space and regular and clearly recognizable routes) by exploiting the favorable climatic conditions in the area and to develop a strategy aimed at reaching a low energy consumption. All windows are equipped with systems to control solar radiation.

In particular, its specific construction techniques are:
- integration in the context of the building of settlements;
- photovoltaic system;
- reducing water consumption by using rainwater for toilet and for irrigation;
- use of materials with recycled content, rapidly renewable and regional;
- automatic checks for a reduction in power consumption;
- automatic checks for a reduction in power consumption;
- management control of lighting systems
- indoor air quality monitoring;
- attention to acoustic performance;
- use of green roof to guarantee a good insulation;
- facilitation of mobility alternative: parking for vehicles with low emission of toxic gases and buses, bicycle parking areas, attention to public transportation system.

d) About the evaluation process

In the case of small buildings like this, evaluation process is not too difficult.
As opposed to what was done for the Mezzolombardo school, the volume of the gym has been considered, because of its small size and because it has very low impacts on the overall energy consumption.
The most problematic aspects of the research has been those related to the collection of all necessary documents and information – that sometimes must be too detailed –. For this reason, we chose to perform ENERBUILD evaluation process using data provided by Leed certification protocol. So, we had to verify where these two systems overlap and which Leed credits correspond (even partly) to ENERBUILD criteria and which have been tried for the considered building. However, if there is no correspondence (as in the case of credit D2, and, partly, credit B1) or a Leed credit has not been tried, we considered the correspondent ENERBUILD criterion not satisfied. Section C and criteria B3 and E1 – which have no Leed equivalent – are instead calculated separately, according to the instructions of the manual.
Here follows the comparison between ENERBUILD criteria and Leed credits tried for this building.

A Quality of location and facilities

A1 Access to public transport network

Leed evaluation process requires easy access to public transportation through SS Credit 4.1 "Alternative Transportation: Public Transportation Access". To get this criterion, Leed and ENERBUILD evaluations use very similar approaches, both requiring to place the project near an existing public bus or train stop. However, compared to Leed certification, ENERBUILD evaluation process also requires a transport minimum hourly frequency.

A2 Ecological quality of site

There is no direct correspondence between LEED credits and ENERBUILD A2 criterion. However, it is possible to calculate area's ecological index by Leed certification, and in particular through SS Credit 1 "Site Selection" and through SS Credit 2 "Density & Community Connectivity".

B Process and planning quality

B1 Decision making and determination of goals – B2 Formulation of verifiable objectives for energetic and ecological measures

Decision making is defined by Leed evaluation process through an initial diagram and through two reports ("Basis Of Design", BOD, and "Owner's Project Requirements", OPR, defined by EA Prerequisite 1, "Fundamental Commissioning of the Building") that contain the objectives to be pursued. Checklist is also a Leed tool which allows to evaluate the project team's choices and to get B1 and B2 ENERBUILD Criteria.

In particular, for credit B1 assessment important criteria are SSPr1, SSPr2, SSC2, SSC4, SSC5 into the SS Section "Sustainable Sites", criteria EAPr2, EAC1 into the EA Section "Energy and Atmosphere", criteria MR C4, MRC 5, MRC6 into the MR Section "Materials and resources" and IEQ Criterion 4 into the EQ Section "Indoor Environmental Quality".

B2 credit is met by two Leed reports – BOD and OPR – defined respectively by the owner and by the design team. These tools are a necessary prerequisite for Leed certification and so B2 criterion is always get.

B3 Standardized calculation of the economic efficiency
Standardized calculation of the economic efficiency (LCC) is not considered by Leed certification and so it was calculated separately.

B4 Product management – Use of low-emission products
Product management is defined into the MR Section "Materials and Resources" and into the EQ Section" Indoor Environmental Quality" through different criteria. In particular, Leed evaluation process requires to use materials with recycled content, rapidly renewable and regional as defined, respectively, by MR Criterion 4, C5 and C6.

However, Leed evaluation process requires full documentation of all materials used but it requires Low-Emitting Materials only for building's interior and in particular, for adhesives and sealants, paints, and coating, carpet systems composite wood, agrifiber products (and according to the manual "Leed for School", furniture) as required by Credits 4.1, C4.2, C4.3, C4.4 into the EQ Section.

Therefore, although the correlation between Leed evaluation and credit B4 is not direct, it is possible to compare these two protocols and ENERBUILD criterion B4 is get if all Leed criteria have been tried.

B5 Planning support for energetic optimization
B5 criterion requires to satisfy the following conditions (each associated with 5 points):
- design by specifying destination, size, frequency and intensity of use of the rooms, and their internal temperatures. This criterion is quite similar to Leed Credit EA1, because building energy simulation requires the same information;
- design of air flow room according to hygiene requirements, as required into the EQ Section, "Indoor Environmental Quality", and in particular by EQPr1 (that requires to establish minimum indoor air quality);
- identification of internal heat sources, condition necessary to develop building energy simulation and so condition already required by Leed Credit EA1;
- calculation of thermal bridges by means of a default value of 0.03 W / (m2 K) and detailed verification of thermal bridges. There is no correspondence to Leed certification system;
- description of energy parameters in the contract, as required by Leed EA Pr1;
- verification of energy aspects of the tenders with the requirements of the contract, condition satisfied because it gets EA Prerequisite 1;
- visits to the site to support local management about energy issues, required also by Credit EA C5;
- provide to conduct the Blower Door test, that is an option required by Leed certification just in case of residential buildings, through EQ Prerequisite 2 (Option 3);
- measure of ventilation system, as required by Leed evaluation with EA Credit 1;
- hydraulic balancing of the heating, as required by Leed EA Credit 1;
- update of the calculations of energy requirements at the end of the construction and conduct a blower door test as final control. This criterion get Leed EA Credit 1;
- verification of energy requirements at the end of the work, as required by Leed EA Credit 5 “Measuring and verification”.

B6 Information for users
Leed evaluation process requires to develop an use and operating manual just if you want to get the EA Credit 3 "Enhanced Commissioning". So, its development – very rare – depends on project team's choice, on building's complexity and on its destination.

C Energy & Utilities (Passive house)
C1 Specific heating demand (PHPP) – C2 Specific cooling demand (PHPP) – C3 Primary energy demand (PHPP) – C4 C_o2-emissions (PHPP)
Section C on the energy requirements (C1, C2, C3) can not be compared directly with EA Leed section "Energy and Atmosphere". In fact, ENERBUILD certification system requires an analysis developed by using Phpp software, whereas Leed evaluation process just requires (EA C1) to observe the minimum prescriptive measures. Also, if you want to obtain the maximum score, Leed requires to develop a dynamic simulation (EA C1, Option 2) that involves comparison of the building with a basic model defined by prescriptive measures (ASHRAE 90.1.2007 norm, Appendix G).

D Health and Comfort
D1 Thermal comfort in summer
Although into the EQ Leed section credits EQ C7.2 and EQ C7.1 define all the requirements for summer thermal comfort, it is necessary to use Phpp software to calculate value hθ (percentage overshoot the maximum allowable temperature in summer) required by ENERBUILD certification system. Therefore, D1 ENERBUILD criterion doesn't find a match with Leed certification.

D2 Ventilation – non energetic aspects
Leed evaluation process defines the requirements for sound insulation just when the building is a school. Again, however, there is no correspondence to ENERBUILD evaluation process: Leed certification requires to achieve in classrooms a background noise up to a maximum level of 45 dBA, equivalent to standards required by ANSI S12.60/2002 (EQ Pr3); instead, ENERBUILD requires not only a background up to a maximum level of 30 dBA, but also that sound pressure level (not exceeding 20 dB) is evaluated with the weighting curve "C". In particular, this second aspect is not considered by Leed evaluation process and so these two evaluation processes are not comparable.

D3 Daylight optimized (+ lightening optimized)
D3 criterion is similar to Leed EQ Credit 8.1 "Daylight and views". However, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area.

E Building materials and construction
E1 OI3TGH-lc ecological index of the thermal building envelope
Although Leed evaluation process rewards the use of ecological materials (MR C4, MR C5 and MR C6), Leed doesn't require the calculation of ecological index of thermal building envelope. So, ENERBUILD E1 criterion doesn't find a match with Leed certification system.

5 Suggestions for improvement of the ENERBUILD-Tool

- Mandatory criteria shouldn't have score;
- Criterion B3: life cycle cost analysis is a mandatory criterion, but in practice LCC are rarely calculated. moreover, prescriptions and assumptions for profitability calculation are not clear and ISO 15686-5 is not sufficient;
- Section C: some PHPP layers require information too detailed and very difficult to collect for already designed and built constructions, especially if nor passive buildings;
- Criterion D3: only regularly occupied spaces and not entire area should be considered in order to calculate the average daylight factor.
-

(28) PP8 Provincia Autonoma die Trento: Extension of Floriani Schoolin Riva del Garda (finished)

1 Basic information about the building

Name of the building	School “I.T.C. Floriani”
Address of the building	Viale Tigli, 38066 Riva del Garda (Tn), Italy
Owner/investor	Autonomous Province of Trento
Year of construction	2008
Building type	Massive construction
Building method	Concrete walls with external insulation
Number of buildings	1
Number of levels above earth	2
Number of levels underground	1
Kind of the public use	School
Effective area for public use in m² (net)	1214.5
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m²	1214.5
Source of energy for heating	*Natural* gas
Heating system	*Central-heating boiler powered by natural* gas
Water heating system	*Central-heating boiler powered by natural* gas
Date of the building evaluation	2009

2 Execution of the building evaluation with the ENERBUILD tool

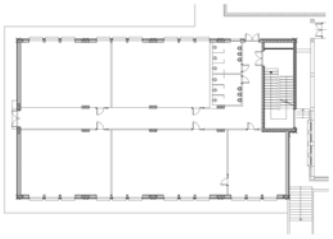
Responsible Organisation: University of Trento – Department of Civil and Environmental Engineering - Italy
Contact person: Prof. Antonio Frattari
Telephone: +390461282668 Email: antonio.frattari@unitn.it

Temperature for thermal comfort in summertime: 27 °C

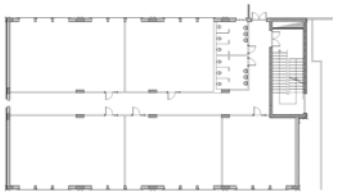
3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	60
A	1	Access to public transport network		50	18
A	2	Ecological quality of site		50	42
B		Process and planning quality		max. 200	140
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management – Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	45
B	6	Information for users		25	0
C		Energy & Utilities (Passive house)		max. 350	312
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	37
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	10
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	10
E		Building materials and construction		max. 200	130
E	1	$OI3_{TGH-Ic}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	130
Sum				max. 1000	652

Elevation interior



Ground floor plan



First floor plan

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally

The building scored 652 points, the score is quite high and the correspondence with LEED Gold level is good (LEED Gold goes from 60 to 79 point in a scale 0-100). So its level of environmental sustainability is quite good. We could expect a better score with the ENERBUILD-Tool.

In particular, the project doesn't get any score in section "Health and Comfort":

1. For what concerns the criterion "optimized Daylight", LEED do not consider acoustic criteria, so no calculus is available on this issue.
2. Regarding "Thermal comfort in summer", even if T upper limit has been raised to 27°C (in order to consider higher summer temperature in Italian situation), the upper allowed temperature is overshoot for the 31.5 % of time. This is probably due to the fact that schools are not used from middle June to middle September, so not enough attention has been put to summer overheating. Besides, in Mediterranean countries it is quite difficult that upper temperature is overshoot less than 5% of time in summer, so this limit should be raised. In school, only effectively period of use should be considered.
3. Considering "Daylight optimized", Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area, that is effectively a too severe request (in fact LEED criterion is fully satisfied).

b) About the planning process

The original project was subjected of a re-planning to the achievement of high sustainability standards. All rooms have been re-planned according to the parameters set by Leed evaluation system.

Thanks to this re-design, among the four possible Leed certification levels(Certified, Silver, Gold, Platinum), Riva's school was ranked "Gold" (corresponding to score of 60-79 points), becoming the first Italian building that reached the highest ranking level.

For what concerns the planning process, it has been done using LEED as reference and not ENERBUILD tool, that has been applied in a second moment and so it can be considered more an evaluation tool than a planning tool. However, the following considerations about ENERBUILD tool can be done:

1. Point A1 is clear and easy to be faced.
2. Point A2 is well defined and the proposed index is easy to be used.
3. Points B1 and B2 are very detailed and well done. All the most important aspects of planning phase are taken into consideration. Each point has a proper reference with LEED tool (see even following detailed considerations).

4. Point B3 has been quite difficult to be done. LCC is a procedure more and more important in the planning phase (together with LCA) and it is important that in ENERBUILD it has a good relevance, but the ISO Standard and the Austrian standard has been difficult to be applied. For this reason, a simplified method has been followed considering the classical value analysis theory.
5. Point B4 is very important concerning human health in indoor spaces. ENERBUILD is quite complete even if the definition of the percentage of structures with ecological declaration is not clear. It could be easier to have reference to European standards and not to local ones. Even a list of most common building components could be useful.
6. Point B5 is of course an important issue and it has clear reference, point by point, with LEED protocol. It is sufficiently clear and not difficult to be faced.
7. Point B6 is clear and very important. Unfortunately, not all the energy and environmental tools consider this aspect.
8. Point C1 to C4. This is the most problematic section of the tool. In fact, we agree that, in order to have comparable results, the same energy calculation tool should be used. However, PHPP is a good tool only if a passive building has been designed, and the pilot building considered is not a passive one. Moreover, cooling demand is often overestimated and low points are given. It is our opinion that other software should be used, even national ones, taking into account that all the partners should agree on some “fixed points” so that final results of the energy calculation could be compared. For example, it is important to consider international standards. But the choice of the energy calculation tool should be free.
9. Point D1: refer to previous comment.
10. Point D2: in this case, it should be better to leave the partner free to consider national legislation and not fixed values. Also the acoustic index used should refer to international standards. In the case of the pilot building considered, calculation were not made so it is quite impossible to calculate the correct indexes.
11. Point D3: the point is simple and using the EN standard it is easy to calculate. Anyway, the 5% of DF required seems to be too high. In our opinion, following LEED specifications, a daylight factor up to a maximum percentage of 2% in 75% of frequently used spaces should be sufficient.
12. Point E1: the procedure for calculating the OI3 index is quite simple and it is an important aspects of building construction.

GBC certificate

c) About the building itself

The building is the enlargement of the pre-existing school: the project involved the construction of a new building with 10 new classrooms over two floors and with a storage underground.

In particular, its specific construction techniques are:
- use of green roof to guarantee a good insulation;
- reducing water consumption by using rainwater for toilet and irrigation;
- external flooring surfaces with high solar reflectance and high thermal emittance to avoid "heat island" effect;
- reducing water consumption by using low-flow toilets and faucets;
- waste collection areas on each floor of the building;
- increased presence of green areas within the area;
- use of regional (certified timber) and renewable materials;
- management of the site during the construction (all construction materials were disposed in appropriate recycling centres);
- final testing of all systems by a Commissioning Authority.

d) About the evaluation process

In the case of small buildings such as this one, evaluation process is feasible and practicable.

The most problematic aspects of the research has been those related to the collection of all necessary documents and information – that sometimes must be too detailed –. For this reason, we chose to perform ENERBUILD evaluation process using data provided by Leed certification protocol. So, we had to verify where these two systems overlap and which Leed credits correspond (even partly) to ENERBUILD criteria and which have been tried for the considered building. However, if there is no correspondence (as in the case of credit D2, and, partly, credit B1) or a Leed credit has not been tried, we considered the correspondent ENERBUILD criterion not satisfied. Section C and criteria B3 and E1 – which have no Leed equivalent – are instead calculated separately, according to the instructions of the manual.

Here follows the comparison between ENERBUILD criteria and Leed credits tried for this building.

A Quality of location and facilities

A1 Access to public transport network

Leed evaluation process requires easy access to public transportation through SS Credit 4.1 "Alternative Transportation: Public Transportation Access". To get this criterion, Leed and ENERBUILD evaluations use very similar approaches, both requiring to place the project near an existing public bus or train stop. However, compared to Leed certification, ENERBUILD evaluation process also requires a transport minimum hourly frequency.

A2 Ecological quality of site

There is no direct correspondence between LEED credits and ENERBUILD A2 criterion. However, it is possible to calculate area's ecological index by Leed certification, and in particular through SS Credit 1 "Site Selection" and through SS Credit 2 "Density & Community Connectivity".

B Process and planning quality

B1 Decision making and determination of goals – B2 Formulation of verifiable objectives for energetic and ecological measures

Decision making is defined by Leed evaluation process through an initial diagram and through two reports ("Basis Of Design", BOD, and "Owner's Project Requirements", OPR, defined by EA Prerequisite 1, "Fundamental Commissioning of the Building") that contain the objectives to be pursued. Checklist is also a Leed tool which allows to evaluate the project team's choices and to get B1 and B2 ENERBUILD Criteria.

In particular, for credit B1 assessment important criteria are SSPr1, SSPr2, SSC2, SSC4, SSC5 into the SS Section "Sustainable Sites", criteria EAPr2, EAC1 into the EA Section "Energy and Atmosphere", criteria MR C4, MRC 5, MRC6 into the MR Section "Materials and resources" and IEQ Criterion 4 into the EQ Section "Indoor Environmental Quality".

B2 credit is met by two Leed reports – BOD and OPR – defined respectively by the owner and by the design team. These tools are a necessary prerequisite for Leed certification and so B2 criterion is always get.

B3 Standardized calculation of the economic efficiency
Standardized calculation of the economic efficiency (LCC) is not considered by Leed certification and so it was calculated separately.

B4 Product management – Use of low-emission products
Product management is defined into the MR Section "Materials and Resources" and into the EQ Section" Indoor Environmental Quality" through different criteria. In particular, Leed evaluation process requires to use materials with recycled content, rapidly renewable and regional as defined, respectively, by MR Criterion 4, C5 and C6.

However, Leed evaluation process requires full documentation of all materials used but it requires Low-Emitting Materials only for building's interior and in particular, for adhesives and sealants, paints, and coating, carpet systems composite wood, agrifiber products (and according to the manual "Leed for School", furniture) as required by Credits 4.1, C4.2, C4.3, C4.4 into the EQ Section.

Therefore, although the correlation between Leed evaluation and credit B4 is not direct, it is possible to compare these two protocols and ENERBUILD criterion B4 is get if all Leed criteria have been tried.

B5 Planning support for energetic optimization
B5 criterion requires to satisfy the following conditions (each associated with 5 points):
- design by specifying destination, size, frequency and intensity of use of the rooms, and their internal temperatures. This criterion is quite similar to Leed Credit EA1, because building energy simulation requires the same information;
- design of air flow room according to hygiene requirements, as required into the EQ Section, "Indoor Environmental Quality", and in particular by EQPr1 (that requires to establish minimum indoor air quality);
- identification of internal heat sources, condition necessary to develop building energy simulation and so condition already required by Leed Credit EA1;
- calculation of thermal bridges by means of a default value of 0.03 W / (m2 K) and detailed verification of thermal bridges. There is no correspondence to Leed certification system;
- description of energy parameters in the contract, as required by Leed EA Pr1;
- verification of energy aspects of the tenders with the requirements of the contract, condition satisfied because it gets EA Prerequisite 1;
- visits to the site to support local management about energy issues, required also by Credit EA C5;
- provide to conduct the Blower Door test, that is an option required by Leed certification just in case of residential buildings, through EQ Prerequisite 2 (Option 3);
- measure of ventilation system, as required by Leed evaluation with EA Credit 1;
- hydraulic balancing of the heating, as required by Leed EA Credit 1;
- update of the calculations of energy requirements at the end of the construction and conduct a blower door test as final control. This criterion get Leed EA Credit 1;
- verification of energy requirements at the end of the work, as required by Leed EA Credit 5 “Measuring and verification”.

B6 Information for users
Leed evaluation process requires to develop an use and operating manual just if you want to get the EA Credit 3 "Enhanced Commissioning". So, its development – very rare – depends on project team's choice, on building's complexity and on its destination.

C Energy & Utilities (Passive house)
C1 Specific heating demand (PHPP) – C2 Specific cooling demand (PHPP) – C3 Primary energy demand (PHPP) – C4 C_O2-emissions (PHPP)
Section C on the energy requirements (C1, C2, C3) can not be compared directly with EA Leed section "Energy and Atmosphere". In fact, ENERBUILD certification system requires an analysis developed by using Phpp software, whereas Leed evaluation process just requires (EA C1) to observe the minimum prescriptive measures. Also, if you want to obtain the maximum score, Leed requires to develop a dynamic simulation (EA C1, Option 2) that involves comparison of the building with a basic model defined by prescriptive measures (ASHRAE 90.1.2007 norm, Appendix G).

D Health and Comfort
D1 Thermal comfort in summer
Although into the EQ Leed section credits EQ C7.2 and EQ C7.1 define all the requirements for summer thermal comfort, it is necessary to use Phpp software to calculate value hθ (percentage overshoot the maximum allowable temperature in summer) required by ENERBUILD certification system. Therefore, D1 ENERBUILD criterion doesn't find a match with Leed certification.

D2 Ventilation – non energetic aspects
Leed evaluation process defines the requirements for sound insulation just when the building is a school. Again, however, there is no correspondence to ENERBUILD evaluation process: Leed certification requires to achieve in classrooms a background noise up to a maximum level of 45 dBA, equivalent to standards required by ANSI S12.60/2002 (EQ Pr3); instead, ENERBUILD requires not only a background up to a maximum level of 30 dBA, but also that sound pressure level (not exceeding 20 dB) is evaluated with the weighting curve "C". In particular, this second aspect is not considered by Leed evaluation process and so these two evaluation processes are not comparable.

D3 Daylight optimized (+ lightening optimized)
D3 criterion is similar to Leed EQ Credit 8.1 "Daylight and views". However, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area.

E Building materials and construction
E1 OI3TGH-lc ecological index of the thermal building envelope
Although Leed evaluation process rewards the use of ecological materials (MR C4, MR C5 and MR C6), Leed doesn't require the calculation of ecological index of thermal building envelope. So, ENERBUILD E1 criterion doesn't find a match with Leed certification system.

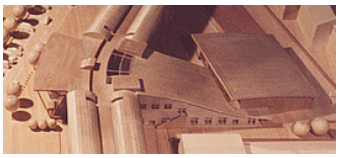
5 Suggestions for improvement of the ENERBUILD-Tool

- Mandatory criteria shouldn't have score;
- Criterion B3: life cycle cost analysis is a mandatory criterion, but in practice LCC are rarely calculated. moreover, prescriptions and assumptions for profitability calculation are not clear and ISO 15686-5 is not sufficient;
- Section C: some PHPP layers require information too detailed and very difficult to collect for already designed and built constructions, especially if nor passive buildings;
- Criterion D3: only regularly occupied spaces and not entire area should be considered in order to calculate the average daylight factor.

(29) PP8 Provincia Autonoma die Trento: Mezzolombardo School (planning/building phase)

Maquette picture

Maquette picture



Maquette picture

1 Basic information about the building

Name of the building	Mezzolombardo School
Address of the building	Via Perlasca, 38017 Mezzolombardo (Tn), Italy
Owner/investor	Autonomous Province of Trento – Servizio Edilizia Pubblica
Year of construction	2003
Building type	Massive construction
Building method	Concrete walls with external insulation
Number of buildings	1
Number of levels above earth	3
Number of levels underground	1
Kind of the public use	School
Effective area for public use in m ² (net)	4012 m ²
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	4012 m ²
Source of energy for heating	*Natural* gas
Heating system	*Central-heating boiler powered by natural* gas
Water heating system	Central-heating boiler powered by natural gas+solar
Date of the building evaluation	In progress

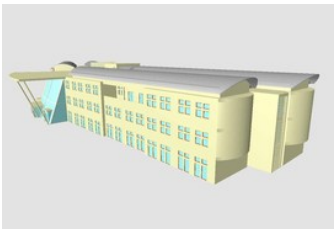
2 Execution of the building evaluation with the ENERBUILD tool

Responsible Organisation: University of Trento – Department of Civil and Environmental Engineering - Italy
Contact person: Prof. Antonio Frattari
Telephone: +390461282668 Email: antonio.frattari@unitn.it

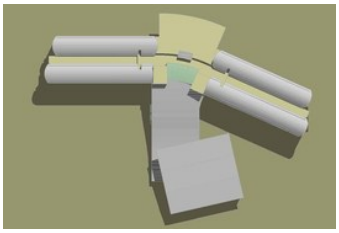
Temperature for thermal comfort in summertime: 27 °C

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	92
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	42
B		Process and planning quality		max. 200	195
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	35
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	235
C	1	Specific heating demand (PHPP)	M	100	40
C	2	Specific cooling demand (PHPP)	M	100	55
C	3	Primary energy demand (PHPP)	M	125	93
C	4	CO2-emissions (PHPP)		50	47
D		Health and Comfort		max. 250	30
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	30
E		Building materials and construction		max. 200	55
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	55
Sum				max. 1000	607



Rendering Picture



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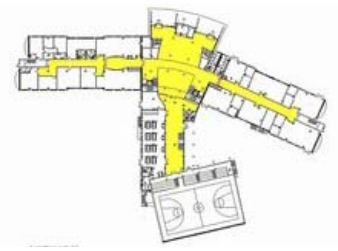


Floor plan

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally

The building received a score of 608 points: it is not very high because of building's large size which requires the use of large-scale plants, and because of a large window on the main front. So, in this case evaluation process was quite difficult and probably not really reliable. The use of PHPP, a software though for passive buildings, was quite difficult to be adopted for this kind of construction giving not well controlled output. Moreover, The great majority of points are lost in part D "Health and comfort". In particular:

1. For what concerns the criterion "optimized Daylight", LEED do not consider acoustic criteria, so no calculus is available at the moment on this issue.
2. Regarding "Thermal comfort in summer", even if T upper limit has been raised to 27°C (in order to consider higher summer temperature in Italian situation), the upper allowed temperature is overshoot for the 15.6 % of time. In Mediterranean countries it is quite difficult that upper temperature is overshoot less than 5% of time in summer, so this limit should be raised.
3. Considering "Daylight optimized", Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area, that is effectively a too severe request.

b) About the planning process

The building was designed to get Leed certification, as well as all public buildings in Trentino.

For what concerns the planning process, it has been done using LEED as reference and not ENERBUILD tool, that has been applied in a second moment and so it can be considered more an evaluation tool than a planning tool. However, the following considerations about ENERBUILD-Tool can be done:

1. Point A1 is clear and easy to be faced.
2. Point A2 is well defined and the proposed index is easy to be used.
3. Points B1 and B2 are very detailed and well done. All the most important aspects of planning phase are taken into consideration. Each point has a proper reference with LEED tool (see even following detailed considerations).
4. Point B3 has been quite difficult to be done. LCC is a procedure more and more important in the planning phase (together with LCA) and it is important that in ENERBUILD it has a good relevance, but the ISO Standard and the Austrian standard has been difficult to be applied. For this reason, a simplified method has been followed considering the classical value analysis theory.

5. Point B4 is very important concerning human health in indoor spaces. ENERBUILD is quite complete even if the definition of the percentage of structures with ecological declaration is not clear. It could be easier to have reference to European standards and not to local ones. Even a list of most common building components could be useful.
6. Point B5 is of course an important issue and it has clear reference, point by point, with LEED protocol. It is sufficiently clear and not difficult to be faced.
7. Point B6 is clear and very important. Unfortunately, not all the energy and environmental tools consider this aspect.
8. Point C1 to C4. This is the most problematic section of the tool. In fact, we agree that, in order to have comparable results, the same energy calculation tool should be used. However, PHPP is a good tool only if a passive building has been designed, and the pilot building considered is not a passive one. Moreover, cooling demand is often overestimated and low points are given. It is our opinion that other software should be used, even national ones, taking into account that all the partners should agree on some “fixed points” so that final results of the energy calculation could be compared. For example, it is important to consider international standards. But the choice of the energy calculation tool should be free.
9. Point D1: refer to previous comment.
10. Point D2: in this case, it should be better to leave the partner free to consider national legislation and not fixed values. Also the acoustic index used should refer to international standards. In the case of the pilot building considered, calculation were not made so it is quite impossible to calculate the correct indexes.
11. Point D3: the point is simple and using the EN standard it is easy to calculate. Anyway, the 5% of DF required seems to be too high. In our opinion, following LEED specifications, a daylight factor up to a maximum percentage of 2% in 75% of frequently used spaces should be sufficient.
12. Point E1: the procedure for calculating the OI3 index is quite simple and it is an important aspects of building construction.

c) About the building itself

The new school will house 4300 students and it will consist of:

- 25 classrooms and 7 workshops;
- physics laboratories;
- 2 science and chemical laboratories;
- 3 drawing classrooms;
- 4 computer labs and a mechanical laboratory;
- 1 library (about 100 mq);
- a lecture hall (approximately 80/100 seats);
- 2 / 3 splitable rooms;
- secretarial and Office Chair;
- a teacher room;
- hall, bar, vending;
- gym with basketball court (approximately 80/100 seats);
- refectory for 80/100 seats.

The building was also designed to obtain Leed certification. In particular, its specific construction techniques are:

- great attention to stormwater design (quality and quantity control) and to site development (in particular, to maximization of open spaces);
- optimization of building’s energy performances;
- use of renewable energies such as solar;
- high internal environmental comfort provided by a forced-air ventilation with heat recovery;
- use of regional materials.

d) About the evaluation process

In this case, the evaluation process was not easy at all, because of the large building size and complexity of its functions. In fact, the institute hosts – in addition to regular classrooms – workshops, kitchens, a refectory and a gym. Therefore, it was quite difficult to compile PHPP layers (probably, this software was designed for small buildings), being impossible to define the same values of air exchange and of internal temperatures for all spaces (as required by PHPP).

So, the gym's volume has not been considered: without this simplification the calculation of Specific heating demand and of Specific cooling demand by PHPP (C1, C2 criterion) could'nt be reliable.

The other problematic aspect of the research is related to the collection of all necessary documents and information - that sometimes must be too detailed – . For this reason, we chose to perform ENERBUILD evaluation process using data provided by Leed certification protocol. So, we had to verify where these two systems overlap and which Leed credits correspond (even partly) to ENERBUILD criteria and which have been tried for the considered building. However, if there is no correspondence (as in the case of credit D2, and, partly, credit B1) or a Leed credit has not been tried, we considered the correspondent ENERBUILD criterion not satisfied. Section C and criteria B3 and E1 – which have no Leed equivalent – are instead calculated separately, according to the instructions of the manual.

Here follows the comparison between ENERBUILD criteria and Leed credits tried for this building.

A Quality of location and facilities

A1 Access to public transport network

Leed evaluation process requires easy access to public transportation through SS Credit 4.1 "Alternative Transportation: Public Transportation Access". To get this criterion, Leed and ENERBUILD evaluations use very similar approaches, both requiring to place the project near an existing public bus or train stop. However, compared to Leed certification, ENERBUILD evaluation process also requires a transport minimum hourly frequency.

A2 Ecological quality of site

There is no direct correspondence between LEED credits and ENERBUILD A2 criterion. However, it is possible to calculate area's ecological index by Leed certification, and in particular through SS Credit 1 "Site Selection" and through SS Credit 2 "Density & Community Connectivity".

B Process and planning quality

B1 Decision making and determination of goals – B2 Formulation of verifiable objectives for energetic and ecological measures

Decision making is defined by Leed evaluation process through an initial diagram and through two reports ("Basis Of Design", BOD, and "Owner's Project Requirements", OPR, defined by EA Prerequisite 1, "Fundamental Commissioning of the Building") that contain the objectives to be pursued. Checklist is also a Leed tool which allows to evaluate the project team's choices and to get B1 and B2 ENERBUILD Criteria.

In particular, for credit B1 assessment important criteria are SSPr1, SSPr2, SSC2, SSC4, SSC5 into the SS Section "Sustainable Sites", criteria EAPr2, EAC1 into the EA Section "Energy and Atmosphere", criteria MR C4, MRC 5, MRC6 into the MR Section "Materials and resources" and IEQ Criterion 4 into the EQ Section "Indoor Environmental Quality".

B2 credit is met by two Leed reports – BOD and OPR – defined respectively by the owner and by the design team. These tools are a necessary prerequisite for Leed certification and so B2 criterion is always get.

B3 Standardized calculation of the economic efficiency
Standardized calculation of the economic efficiency (LCC) is not considered by Leed certification and so it was calculated separately.

B4 Product management – Use of low-emission products
Product management is defined into the MR Section "Materials and Resources" and into the EQ Section" Indoor Environmental Quality" through different criteria. In particular, Leed evaluation process requires to use materials with recycled content, rapidly renewable and regional as defined, respectively, by MR Criterion 4, C5 and C6.

However, Leed evaluation process requires full documentation of all materials used but it requires Low-Emitting Materials only for building's interior and in particular, for adhesives and sealants, paints, and coating, carpet systems composite wood, agrifiber products (and according to the manual "Leed for School", furniture) as required by Credits 4.1, C4.2, C4.3, C4.4 into the EQ Section.

Therefore, although the correlation between Leed evaluation and credit B4 is not direct, it is possible to compare these two protocols and ENERBUILD criterion B4 is get if all Leed criteria have been tried.

B5 Planning support for energetic optimization
B5 criterion requires to satisfy the following conditions (each associated with 5 points):
- design by specifying destination, size, frequency and intensity of use of the rooms, and their internal temperatures. This criterion is quite similar to Leed Credit EA1, because building energy simulation requires the same information;
- design of air flow room according to hygiene requirements, as required into the EQ Section, "Indoor Environmental Quality", and in particular by EQPr1 (that requires to establish minimum indoor air quality);
- identification of internal heat sources, condition necessary to develop building energy simulation and so condition already required by Leed Credit EA1;
- calculation of thermal bridges by means of a default value of 0.03 W / (m2 K) and detailed verification of thermal bridges. There is no correspondence to Leed certification system;
- description of energy parameters in the contract, as required by Leed EA Pr1;
- verification of energy aspects of the tenders with the requirements of the contract, condition satisfied because it gets EA Prerequisite 1;
- visits to the site to support local management about energy issues, required also by Credit EA C5;
- provide to conduct the Blower Door test, that is an option required by Leed certification just in case of residential buildings, through EQ Prerequisite 2 (Option 3);
- measure of ventilation system, as required by Leed evaluation with EA Credit 1;
- hydraulic balancing of the heating, as required by Leed EA Credit 1;
- update of the calculations of energy requirements at the end of the construction and conduct a blower door test as final control. This criterion get Leed EA Credit 1;
- verification of energy requirements at the end of the work, as required by Leed EA Credit 5 “Measuring and verification”.

B6 Information for users
Leed evaluation process requires to develop an use and operating manual just if you want to get the EA Credit 3 "Enhanced Commissioning". So, its development – very rare – depends on project team’s choice, on building’s complexity and on its destination.

C Energy & Utilities (Passive house)
C1 Specific heating demand (PHPP) – C2 Specific cooling demand (PHPP) – C3 Primary energy demand (PHPP) – C4 C_o2-emissions (PHPP)
Section C on the energy requirements (C1, C2, C3) can not be compared directly with EA Leed section "Energy and Atmosphere". In fact, ENERBUILD certification system requires an analysis developed by using Phpp software, whereas Leed evaluation process just requires (EA C1) to observe the minimum prescriptive measures. Also, if you want to obtain the maximum score, Leed requires to develop a dynamic simulation (EA C1, Option 2) that involves comparison of the building with a basic model defined by prescriptive measures (ASHRAE 90.1.2007 norm, Appendix G).

D Health and Comfort
D1 Thermal comfort in summer
Although into the EQ Leed section credits EQ C7.2 and EQ C7.1 define all the requirements for summer thermal comfort, it is necessary to use Phpp software to calculate value hθ (percentage overshoot the maximum allowable temperature in summer) required by ENERBUILD certification system. Therefore, D1 ENERBUILD criterion doesn't find a match with Leed certification.

D2 Ventilation – non energetic aspects
Leed evaluation process defines the requirements for sound insulation just when the building is a school. Again, however, there is no correspondence to ENERBUILD evaluation process: Leed certification requires to achieve in classrooms a background noise up to a maximum level of 45 dBA, equivalent to standards required by ANSI S12.60/2002 (EQ Pr3); instead, ENERBUILD requires not only a background up to a maximum level of 30 dBA, but also that sound pressure level (not exceeding 20 dB) is evaluated with the weighting curve "C". In particular, this second aspect is not considered by Leed evaluation process and so these two evaluation processes are not comparable.

D3 Daylight optimized (+ lightening optimized)
D3 criterion is similar to Leed EQ Credit 8.1 "Daylight and views". However, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area.

E Building materials and construction
E1 OI3TGH-lc ecological index of the thermal building envelope
Although Leed evaluation process rewards the use of ecological materials (MR C4, MR C5 and MR C6), Leed doesn't require the calculation of ecological index of thermal building envelope. So, ENERBUILD E1 criterion doesn't find a match with Leed certification system.

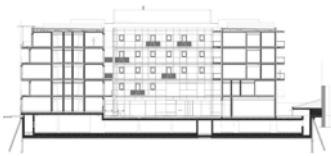
5 Suggestions for improvement of the ENERBUILD-Tool

- Mandatory criteria shouldn't have score;
- Criterion B3: life cycle cost analysis is a mandatory criterion, but in practice LCC are rarely calculated. moreover, prescriptions and assumptions for profitability calculation are not clear and ISO 15686-5 is not sufficient;
- Section C: some PHPP layers require information too detailed and very difficult to collect for already designed and built constructions, especially if nor passive buildings;
- Criterion D3: only regularly occupied spaces and not entire area should be considered in order to calculate the average daylight factor.

(30) PP8 Provincia Autonoma die Trento: Student residence Mayer in Trento (planning/building phase)

Picture outside

Picture outside



Elevation interior

1 Basic information about the building

Name of the building	University Residence "Mayer"
Address of the building	Corso Buonarroti - Via Lampi, 38122 Trento, Italy
Owner/investor	Opera Universitaria - Autonomous Province of Trento
Year of construction	-
Building type	Lightweight construction
Building method	Cross-laminated timber walls (X-Lam System)
Number of buildings	1
Number of levels above earth	4
Number of levels underground	1
Kind of the public use	University residence
Effective area for public use in m² (net)	3.641,57 m^2
Additional private uses	-
Effective area for private use in m² (net)	-
Total effective area in m ²	3.641,57 m^2
Source of energy for heating	Solar and ground source
Heating system	Solar and ground source heat-pump system
Water heating system	Solar and ground source heat-pump system
Date of the building evaluation	In progress

2 Execution of the building evaluation with the ENERBUILD tool

Responsible Organisation: University of Trento – Department of Civil and Environmental Engineering - Italy
Contact person: Prof. Antonio Frattari
Telephone: +390461282668 Email: antonio.frattari@unitn.it

Temperature for thermal comfort in summertime: 27 °C

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	100
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	180
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	45
B	6	Information for users		25	0
C		Energy & Utilities (Passive house)		max. 350	246
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	73
C	3	Primary energy demand (PHPP)	M	125	34
C	4	C_O2-emissions (PHPP)		50	39
D		Health and Comfort		max. 250	50
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	109
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	109
Sum				max. 1000	685

Elevation interior

Ground floor plan

First floor plan

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally

The building scored 685 points, well representative of its high level of environmental sustainability. In fact, it is an innovative project of prefabricated wooden building, cutting edge of environmental sustainability and of use of renewable energy. The great majority of points are lost in part D “Health and comfort”. In particular:

4. For what concerns the criterion “optimized Daylight”, LEED do not consider acoustic criteria, so no calculus is available at the moment on this issue.
5. Regarding “Thermal comfort in summer”, even if T upper limit has been raised to 27°C (in order to consider higher summer temperature in Italian situation), the upper allowed temperature is overshoot for the 16.4 % of time. In Mediterranean countries it is quite difficult that upper temperature is overshoot less than 5% of time in summer, so this limit should be raised even taking into account only the effective period of usage.
6. Considering “Daylight optimized”, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area, that is effectively a too severe request. Being the Daylight factor 4,76%, we considered fulfilled the criterion.

b) About the planning process

The building was designed to obtain a Leed NC 2.2 Gold certification, corresponding to a score of 44-57 points.

For what concerns the planning process, it has been done using LEED as reference and not ENERBUILD-Tool, that has been applied in a second moment and so it can be considered more an evaluation tool than a planning tool. However, the following considerations about ENERBUILD-Tool can be done:

1. Point A1 is clear and easy to be faced.
2. Point A2 is well defined and the proposed index is easy to be used.
3. Points B1 and B2 are very detailed and well done. All the most important aspects of planning phase are taken into consideration. Each point has a proper reference with LEED tool (see even following detailed considerations).
4. Point B3 has been quite difficult to be done. LCC is a procedure more and more important in the planning phase (together with LCA) and it is important that in ENERBUILD it has a good relevance, but the ISO Standard and the Austrian standard has been difficult to be applied. For this reason, a simplified method has been followed considering the classical value analysis theory.

5. Point B4 is very important concerning human health in indoor spaces. ENERBUILD is quite complete even if the definition of the percentage of structures with ecological declaration is not clear. It could be easier to have reference to European standards and not to local ones. Even a list of most common building components could be useful.
6. Point B5 is of course an important issue and it has clear reference, point by point, with LEED protocol. It is sufficiently clear and not difficult to be faced.
7. Point B6 is clear and very important. Unfortunately, not all the energy and environmental tools consider this aspect.
8. Point C1 to C4. This is the most problematic section of the tool. In fact, we agree that, in order to have comparable results, the same energy calculation tool should be used. However, PHPP is a good tool only if a passive building has been designed, and the pilot building considered is not a passive one. Moreover, cooling demand is often overestimated and low points are given. It is our opinion that other software should be used, even national ones, taking into account that all the partners should agree on some “fixed points” so that final results of the energy calculation could be compared. For example, it is important to consider international standards. But the choice of the energy calculation tool should be free.
9. Point D1: refer to previous comment.
10. Point D2: in this case, it should be better to leave the partner free to consider national legislation and not fixed values. Also the acoustic index used should refer to international standards. In the case of the pilot building considered, calculation were not made so it is quite impossible to calculate the correct indexes.
11. Point D3: the point is simple and using the EN standard it is easy to calculate. Anyway, the 5% of DF required seems to be too high. In our opinion, following LEED specifications, a daylight factor up to a maximum percentage of 2% in 75% of frequently used spaces should be sufficient.
12. Point E1: the procedure for calculating the OI3 index is quite simple and it is an important aspects of building construction.

c) About the building itself

The project aims to provide a new student residence in the urban area of Trento, and it involves the construction of rooms and apartments, a little gym, some common areas and some public spaces such as an auditorium and a library.

The building is like a court open to south because it wants to create a "contact" between the residence and the city and it wants to ensure optimal exposure for sunshine and for sound insulation, being located in the proximity of the railway.

The building obtains score in all Leed categories, being a well-balanced design in all aspects of sustainability.

In particular, its specific construction techniques are:

- cross-laminated timber walls (X-Lam system);
- ventilated facades realized by using fiber-reinforced concrete panels, a natural material with good durability;
- 14 cm wood wool insulation in all perimeter walls;
- green roof to guarantee a good insulation;
- renewable energy through solar and ground source heat-pump system for heating and for solar cooling;
- photovoltaic system;
- high comfort guaranteed by a forced ventilation system complete of high-efficiency heat recovery units for air quality and for summer moisture control;
- external mobile screens to control summer solar gain;
- sensors and automatic controls to decrease electricity consumption;
- reducing water consumption by using rainwater for toilet and for irrigation.

d) About the evaluation process

In the case of small buildings such as this one, evaluation process is feasible and practicable.

The most problematic aspects of the research has been those related to the collection of all necessary documents and information – that sometimes must be too detailed –. For this reason, we chose to perform ENERBUILD evaluation process using data provided by Leed certification protocol. So, we had to verify where these two systems overlap and which Leed credits correspond (even partly) to ENERBUILD criteria and which have been tried for the considered building. However, if there is no correspondence (as in the case of credit D2, and, partly, credit B1) or a Leed credit has not been tried, we considered the correspondent ENERBUILD criterion not satisfied. Section C and criteria B3 and E1 – which have no Leed equivalent – are instead calculated separately, according to the instructions of the manual.

Here follows the comparison between ENERBUILD criteria and Leed credits tried for this building.

A Quality of location and facilities

A1 Access to public transport network

Leed evaluation process requires easy access to public transportation through SS Credit 4.1 "Alternative Transportation: Public Transportation Access". To get this criterion, Leed and ENERBUILD evaluations use very similar approaches, both requiring to place the project near an existing public bus or train stop. However, compared to Leed certification, ENERBUILD evaluation process also requires a transport minimum hourly frequency.

A2 Ecological quality of site

There is no direct correspondence between LEED credits and ENERBUILD A2 criterion. However, it is possible to calculate area's ecological index by Leed certification, and in particular through SS Credit 1 "Site Selection" and through SS Credit 2 "Density & Community Connectivity".

B Process and planning quality

B1 Decision making and determination of goals – B2 Formulation of verifiable objectives for energetic and ecological measures

Decision making is defined by Leed evaluation process through an initial diagram and through two reports ("Basis Of Design", BOD, and "Owner's Project Requirements", OPR, defined by EA Prerequisite 1, "Fundamental Commissioning of the Building") that contain the objectives to be pursued. Checklist is also a Leed tool which allows to evaluate the project team's choices and to get B1 and B2 ENERBUILD Criteria.

In particular, for credit B1 assessment important criteria are SSPr1, SSPr2, SSC2, SSC4, SSC5 into the SS Section "Sustainable Sites", criteria EAPr2, EAC1 into the EA Section "Energy and Atmosphere", criteria MR C4, MRC 5, MRC6 into the MR Section "Materials and resources" and IEQ Criterion 4 into the EQ Section "Indoor Environmental Quality".

B2 credit is met by two Leed reports – BOD and OPR – defined respectively by the owner and by the design team. These tools are a necessary prerequisite for Leed certification and so B2 criterion is always get.

B3 Standardized calculation of the economic efficiency

Standardized calculation of the economic efficiency (LCC) is not considered by Leed certification and so it was calculated separately.

B4 Product management – Use of low-emission products
Product management is defined into the MR Section "Materials and Resources" and into the EQ Section" Indoor Environmental Quality" through different criteria. In particular, Leed evaluation process requires to use materials with recycled content, rapidly renewable and regional as defined, respectively, by MR Criterion 4, C5 and C6.

However, Leed evaluation process requires full documentation of all materials used but it requires Low-Emitting Materials only for building's interior and in particular, for adhesives and sealants, paints, and coating, carpet systems composite wood, agrifiber products (and according to the manual "Leed for School", furniture) as required by Credits 4.1, C4.2, C4.3, C4.4 into the EQ Section.

Therefore, although the correlation between Leed evaluation and credit B4 is not direct, it is possible to compare these two protocols and ENERBUILD criterion B4 is get if all Leed criteria have been tried.

B5 Planning support for energetic optimization
B5 criterion requires to satisfy the following conditions (each associated with 5 points):
- design by specifying destination, size, frequency and intensity of use of the rooms, and their internal temperatures. This criterion is quite similar to Leed Credit EA1, because building energy simulation requires the same information;
- design of air flow room according to hygiene requirements, as required into the EQ Section, "Indoor Environmental Quality", and in particular by EQPr1 (that requires to establish minimum indoor air quality);
- identification of internal heat sources, condition necessary to develop building energy simulation and so condition already required by Leed Credit EA1;
- calculation of thermal bridges by means of a default value of 0.03 W / (m2 K) and detailed verification of thermal bridges. There is no correspondence to Leed certification system;
- description of energy parameters in the contract, as required by Leed EA Pr1;
- verification of energy aspects of the tenders with the requirements of the contract, condition satisfied because it gets EA Prerequisite 1;
- visits to the site to support local management about energy issues, required also by Credit EA C5;
- provide to conduct the Blower Door test, that is an option required by Leed certification just in case of residential buildings, through EQ Prerequisite 2 (Option 3);
- measure of ventilation system, as required by Leed evaluation with EA Credit 1;
- hydraulic balancing of the heating, as required by Leed EA Credit 1;
- update of the calculations of energy requirements at the end of the construction and conduct a blower door test as final control. This criterion get Leed EA Credit 1;
- verification of energy requirements at the end of the work, as required by Leed EA Credit 5 "Measuring and verification".

B6 Information for users
Leed evaluation process requires to develop an use and operating manual just if you want to get the EA Credit 3 "Enhanced Commissioning". So, its development – very rare – depends on project team's choice, on building's complexity and on its destination.

C Energy & Utilities (Passive house)
C1 Specific heating demand (PHPP) – C2 Specific cooling demand (PHPP) – C3 Primary energy demand (PHPP) – C4 C_o2-emissions (PHPP)
Section C on the energy requirements (C1, C2, C3) can not be compared directly with EA Leed section "Energy and Atmosphere". In fact, ENERBUILD certification system requires an analysis developed by using Phpp software, whereas Leed evaluation process just requires (EA C1) to observe the minimum prescriptive measures. Also, if you want to obtain the

maximum score, Leed requires to develop a dynamic simulation (EA C1, Option 2) that involves comparison of the building with a basic model defined by prescriptive measures (ASHRAE 90.1.2007 norm, Appendix G).

D Health and Comfort

D1 Thermal comfort in summer

Although into the EQ Leed section credits EQ C7.2 and EQ C7.1 define all the requirements for summer thermal comfort, it is necessary to use Phpp software to calculate value hθ (percentage overshoot the maximum allowable temperature in summer) required by ENERBUILD certification system. Therefore, D1 ENERBUILD criterion doesn't find a match with Leed certification.

D2 Ventilation – non energetic aspects

Leed evaluation process defines the requirements for sound insulation just when the building is a school. Again, however, there is no correspondence to ENERBUILD evaluation process: Leed certification requires to achieve in classrooms a background noise up to a maximum level of 45 dBA, equivalent to standards required by ANSI S12.60/2002 (EQ Pr3); instead, ENERBUILD requires not only a background up to a maximum level of 30 dBA, but also that sound pressure level (not exceeding 20 dB) is evaluated with the weighting curve "C". In particular, this second aspect is not considered by Leed evaluation process and so these two evaluation processes are not comparable.

D3 Daylight optimized (+ lightening optimized)

D3 criterion is similar to Leed EQ Credit 8.1 "Daylight and views". However, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area.

E Building materials and construction

E1 OI3TGH-lc ecological index of the thermal building envelope

Although Leed evaluation process rewards the use of ecological materials (MR C4, MR C5 and MR C6), Leed doesn't require the calculation of ecological index of thermal building envelope. So, ENERBUILD E1 criterion doesn't find a match with Leed certification system.

5 Suggestions for improvement of the ENERBUILD-Tool

- Mandatory criteria shouldn't have score;
- Criterion B3: life cycle cost analysis is a mandatory criterion, but in practice LCC are rarely calculated. moreover, prescriptions and assumptions for profitability calculation are not clear and ISO 15686-5 is not sufficient;
- Section C: some PHPP layers require information too detailed and very difficult to collect for already designed and built constructions, especially if nor passive buildings;
- Criterion D3: only regularly occupied spaces and not entire area should be considered in order to calculate the average daylight factor.

(31) PP8 Provincia Autonoma die Trento: Vigo Rendena Parsonage (planning/building phase)

Picture outside

Picture outside

Picture outside

1 Basic information about the building

Name of the building	Parsonage
Address of the building	via IV Novembre, 38080 Vigo Rendena (Tn) Italy
Owner/investor	Municipality of Vigo Rendena
Year of construction	2009-2010
Building type	Lightweight construction
Building method	Platform frame
Number of buildings	1
Number of levels above earth	2.5
Number of levels underground	1
Kind of the public use	Public use: parsonage and assembly hall.
Effective area for public use in m ² (net)	207.10 m^2
Additional private uses	-
Effective area for private use in m ² (net)	207.10 m^2
Total effective area in m ²	*Natural* gas
Source of energy for heating	*Central-heating boiler powered by natural* gas
Heating system	*Hot water generator powered by biomass (*wood chips and pellets*),* heat pump with puffer store.
Water heating system	In progress

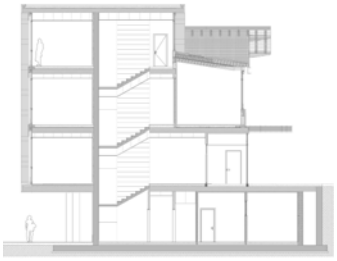
2 Execution of the building evaluation with the ENERBUILD tool

Responsible Organisation: University of Trento – Department of Civil and Environmental Engineering - Italy
Contact person: Prof. Antonio Frattari
Telephone: +390461282668 Email: antonio.frattari@unitn.it

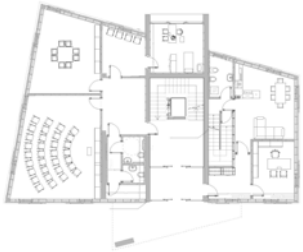
Temperature for thermal comfort in summertime: 27 °C

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	50
A	1	Access to public transport network		50	0
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	135
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	0
B	6	Information for users		25	0
C		Energy & Utilities (Passive house)		max. 350	285
C	1	Specific heating demand (PHPP)	M	100	64
C	2	Specific cooling demand (PHPP)	M	100	46
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	50
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	75
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	75
Sum				max. 1000	595



Elevation interior



Ground floor plan

First floor plan

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally

The building scored 645 points – well representative of its high level of environmental sustainability even if an higher score with ENERBUILD tool could be expected.

Since the building analyzed is relatively small, this evaluation process was feasible and practicable.

The great majority of points are lost in part D “Health and comfort”. In particular:

7. For what concerns the criterion “optimized Daylight”, LEED do not consider acoustic criteria, so no calculus is available at the moment on this issue.
8. Regarding “Thermal comfort in summer”, even if T upper limit has been raised to 27°C (in order to consider higher summer temperature in Italian situation), the upper allowed temperature is overshoot for the 16.4 % of time. In Mediterranean countries it is quite difficult that upper temperature is overshoot less than 5% of time in summer, so this limit should be raised even taking into account only the effective period of usage.

Considering “Daylight optimized”, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area, that is effectively a too severe request. Being the Daylight factor 4,98%, we considered fulfilled the criterion.

b) About the planning process

The building was designed to obtain a Leed NC 2.2 Silver certification, corresponding to a range of 37- 43 points.

For what concerns the planning process, it has been done using LEED as reference and not ENERBUILD tool, that has been applied in a second moment and so it can be considered more an evaluation tool than a planning tool. However, the following considerations about ENERBUILD-Tool can be done:

1. Point A1 is clear and easy to be faced.
2. Point A2 is well defined and the proposed index is easy to be used.
3. Points B1 and B2 are very detailed and well done. All the most important aspects of planning phase are taken into consideration. Each point has a proper reference with LEED tool (see even following detailed considerations).
4. Point B3 has been quite difficult to be done. LCC is a procedure more and more important in the planning phase (together with LCA) and it is important that in ENERBUILD it has a good relevance, but the ISO Standard and the Austrian standard has been difficult to be applied. For this reason, a simplified method has been followed considering the classical value analysis theory.
5. Point B4 is very important concerning human health in indoor spaces. ENERBUILD is quite complete even if the definition of the percentage of structures with ecological

declaration is not clear. It could be easier to have reference to European standards and not to local ones. Even a list of most common building components could be useful.

6. Point B5 is of course an important issue and it has clear reference, point by point, with LEED protocol. It is sufficiently clear and not difficult to be faced.
7. Point B6 is clear and very important. Unfortunately, not all the energy and environmental tools consider this aspect.
8. Point C1 to C4. This is the most problematic section of the tool. In fact, we agree that, in order to have comparable results, the same energy calculation tool should be used. However, PHPP is a good tool only if a passive building has been designed, and the pilot building considered is not a passive one. Moreover, cooling demand is often overestimated and low points are given. It is our opinion that other software should be used, even national ones, taking into account that all the partners should agree on some "fixed points" so that final results of the energy calculation could be compared. For example, it is important to consider international standards. But the choice of the energy calculation tool should be free.
9. Point D1: refer to previous comment.
10. Point D2: in this case, it should be better to leave the partner free to consider national legislation and not fixed values. Also the acoustic index used should refer to international standards. In the case of the pilot building considered, calculation were not made so it is quite impossible to calculate the correct indexes.
11. Point D3: the point is simple and using the EN standard it is easy to calculate. Anyway, the 5% of DF required seems to be too high. In our opinion, following LEED specifications, a daylight factor up to a maximum percentage of 2% in 75% of frequently used spaces should be sufficient.
12. Point E1: the procedure for calculating the OI3 index is quite simple and it is an important aspects of building construction.

c) About the building itself

Vigo Rendena parsonage is an innovative project of prefabricated wood building, cutting edge in terms of environmental sustainability and of use of renewable energy. In fact, characteristic of this building is the use of traditional building materials – as stone, wood, plaster – and the use of optimization systems of energy performance.
In particular, its specific construction techniques are:

- concrete structure just in basement, while in remaining floors the structure is wooden;
- use of renewable energies such as photovoltaic and heating boiler with wood chips and pellets;
- high internal environmental comfort provided by a forced-air ventilation with heat recovery;
- use of regional materials;
- automatic checks for a reduction in power consumption.

d) About the evaluation process

In the case of small buildings like this, evaluation process is feasible and practicable. The most problematic aspects of the research has been those related to the collection of all necessary documents and information – that sometimes must be too detailed –. For this reason, we chose to perform ENERBUILD evaluation process using data provided by Leed certification protocol. So, we had to verify where these two systems overlap and which Leed credits correspond (even partly) to ENERBUILD criteria and which have been tried for the considered building. However, if there is no correspondence (as in the case of credit D2, and, partly, credit B1) or a Leed credit has not been tried, we considered the correspondent ENERBUILD criterion not satisfied. Section C and criteria B3 and E1 – which have no Leed equivalent – are instead calculated separately, according to the instructions of the manual.
Here follows the comparison between ENERBUILD criteria and Leed credits tried for this building.

A Quality of location and facilities

A1 Access to public transport network

Leed evaluation process requires easy access to public transportation through SS Credit 4.1 "Alternative Transportation: Public Transportation Access". To get this criterion, Leed and ENERBUILD evaluations use very similar approaches, both requiring to place the project near an existing public bus or train stop. However, compared to Leed certification, ENERBUILD evaluation process also requires a transport minimum hourly frequency.

A2 Ecological quality of site

There is no direct correspondence between LEED credits and ENERBUILD A2 criterion. However, it is possible to calculate area's ecological index by Leed certification, and in particular through SS Credit 1 "Site Selection" and through SS Credit 2 "Density & Community Connectivity".

B Process and planning quality

B1 Decision making and determination of goals – B2 Formulation of verifiable objectives for energetic and ecological measures

Decision making is defined by Leed evaluation process through an initial diagram and through two reports ("Basis Of Design", BOD, and "Owner's Project Requirements", OPR, defined by EA Prerequisite 1, "Fundamental Commissioning of the Building") that contain the objectives to be pursued. Checklist is also a Leed tool which allows to evaluate the project team's choices and to get B1 and B2 ENERBUILD Criteria.

In particular, for credit B1 assessment important criteria are SSPr1, SSPr2, SSC2, SSC4, SSC5 into the SS Section "Sustainable Sites", criteria EAPr2, EAC1 into the EA Section "Energy and Atmosphere", criteria MR C4, MRC 5, MRC6 into the MR Section "Materials and resources" and IEQ Criterion 4 into the EQ Section "Indoor Environmental Quality".

B2 credit is met by two Leed reports – BOD and OPR – defined respectively by the owner and by the design team. These tools are a necessary prerequisite for Leed certification and so B2 criterion is always get.

B3 Standardized calculation of the economic efficiency

Standardized calculation of the economic efficiency (LCC) is not considered by Leed certification and so it was calculated separately.

B4 Product management – Use of low-emission products

Product management is defined into the MR Section "Materials and Resources" and into the EQ Section" Indoor Environmental Quality" through different criteria. In particular, Leed evaluation process requires to use materials with recycled content, rapidly renewable and regional as defined, respectively, by MR Criterion 4, C5 and C6.

However, Leed evaluation process requires full documentation of all materials used but it requires Low-Emitting Materials only for building's interior and in particular, for adhesives and sealants, paints, and coating, carpet systems composite wood, agrifiber products (and according to the manual "Leed for School", furniture) as required by Credits 4.1, C4.2, C4.3, C4.4 into the EQ Section.

Therefore, although the correlation between Leed evaluation and credit B4 is not direct, it is possible to compare these two protocols and ENERBUILD criterion B4 is get if all Leed criteria have been tried.

B5 Planning support for energetic optimization

B5 criterion requires to satisfy the following conditions (each associated with 5 points):

- design by specifying destination, size, frequency and intensity of use of the rooms, and their internal temperatures. This criterion is quite similar to Leed Credit EA1, because building energy simulation requires the same information;
- design of air flow room according to hygiene requirements, as required into the EQ Section, "Indoor Environmental Quality", and in particular by EQPr1 (that requires to establish minimum indoor air quality);
- identification of internal heat sources, condition necessary to develop building energy simulation and so condition already required by Leed Credit EA1;
- calculation of thermal bridges by means of a default value of 0.03 W / (m2 K) and detailed verification of thermal bridges. There is no correspondence to Leed certification system;
- description of energy parameters in the contract, as required by Leed EA Pr1;
- verification of energy aspects of the tenders with the requirements of the contract, condition satisfied because it gets EA Prerequisite 1;
- visits to the site to support local management about energy issues, required also by Credit EA C5;
- provide to conduct the Blower Door test, that is an option required by Leed certification just in case of residential buildings, through EQ Prerequisite 2 (Option 3);
- measure of ventilation system, as required by Leed evaluation with EA Credit 1;
- hydraulic balancing of the heating, as required by Leed EA Credit 1;
- update of the calculations of energy requirements at the end of the construction and conduct a blower door test as final control. This criterion get Leed EA Credit 1;
- verification of energy requirements at the end of the work, as required by Leed EA Credit 5 "Measuring and verification".
-

B6 Information for users

Leed evaluation process requires to develop an use and operating manual just if you want to get the EA Credit 3 "Enhanced Commissioning". So, its development – very rare – depends on project team's choice, on building's complexity and on its destination.

C Energy & Utilities (Passive house)

C1 Specific heating demand (PHPP) – C2 Specific cooling demand (PHPP) – C3 Primary energy demand (PHPP) – C4 C_o2-emissions (PHPP)

Section C on the energy requirements (C1, C2, C3) can not be compared directly with EA Leed section "Energy and Atmosphere". In fact, ENERBUILD certification system requires an analysis developed by using Phpp software, whereas Leed evaluation process just requires (EA C1) to observe the minimum prescriptive measures. Also, if you want to obtain the maximum score, Leed requires to develop a dynamic simulation (EA C1, Option 2) that involves comparison of the building with a basic model defined by prescriptive measures (ASHRAE 90.1.2007 norm, Appendix G).

D Health and Comfort

D1 Thermal comfort in summer

Although into the EQ Leed section credits EQ C7.2 and EQ C7.1 define all the requirements for summer thermal comfort, it is necessary to use Phpp software to calculate value hθ (percentage overshoot the maximum allowable temperature in summer) required by ENERBUILD certification system. Therefore, D1 ENERBUILD criterion doesn't find a match with Leed certification.

D2 Ventilation – non energetic aspects
Leed evaluation process defines the requirements for sound insulation just when the building is a school. Again, however, there is no correspondence to ENERBUILD evaluation process: Leed certification requires to achieve in classrooms a background noise up to a maximum level of 45 dBA, equivalent to standards required by ANSI S12.60/2002 (EQ Pr3); instead, ENERBUILD requires not only a background up to a maximum level of 30 dBA, but also that sound pressure level (not exceeding 20 dB) is evaluated with the weighting curve "C". In particular, this second aspect is not considered by Leed evaluation process and so these two evaluation processes are not comparable.

D3 Daylight optimized (+ lightening optimized)
D3 criterion is similar to Leed EQ Credit 8.1 "Daylight and views". However, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area.

E Building materials and construction
E1 OI3TGH-lc ecological index of the thermal building envelope
Although Leed evaluation process rewards the use of ecological materials (MR C4, MR C5 and MR C6), Leed doesn't require the calculation of ecological index of thermal building envelope. So, ENERBUILD E1 criterion doesn't find a match with Leed certification system.

5 Suggestions for improvement of the ENERBUILD-Tool

- Mandatory criteria shouldn't have score;
- Criterion B3: life cycle cost analysis is a mandatory criterion, but in practice LCC are rarely calculated. moreover, prescriptions and assumptions for profitability calculation are not clear and ISO 15686-5 is not sufficient;
- Section C: some PHPP layers require information too detailed and very difficult to collect for already designed and built constructions, especially if nor passive buildings;
- Criterion D3: only regularly occupied spaces and not entire area should be considered in order to calculate the average daylight factor.

(32) PP8 Provincia Autonoma die Trento: Vigo Rendena Town Hall (planning/building phase)

1 Basic information about the building

Name of the building	Town hall
Address of the building	via IV Novembre, 38080 Vigo Rendena (Tn) Italy
Owner/investor	Municipality of Vigo Rendena
Year of construction	2009-2010
Building type	Lightweight construction
Building method	Platform frame
Number of buildings	1
Number of levels above earth	3
Number of levels underground	1
Kind of the public use	Public use: offices with multifunctional rooms.
Effective area for public use in m ² (net)	505,96 m^2
Additional private uses	-
Total effective area in m ²	505,96 m^2
Source of energy for heating	Natural gas
Heating system	*Central-heating boiler powered by natural* gas.
Water heating system	*Hot water generator powered by biomass* (wood chips and pellets), heat pump with puffer store.
Date of the building evaluation	In progress.

2 Execution of the building evaluation with the ENERBUILD tool

Responsible Organisation: University of Trento – Department of Civil and Environmental Engineering - Italy
Contact person: Prof. Antonio Frattari
Telephone: +390461282668 Email: antonio.frattari@unitn.it

Temperature for thermal comfort in summertime: 27 °C

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	50
A	1	Access to public transport network		50	0
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	170
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	35
B	6	Information for users		25	0
C		Energy & Utilities (Passive house)		max. 350	330
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	55
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	50
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	0
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	75
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	75
Sum				max. 1000	675

4 Conclusions from the building evaluation with the ENERBUILD-Tool

e) Generally

The building scored 645 points – well representative of its high level of environmental sustainability even if an higher score with ENERBUILD tool could be expected.
Since the building analyzed is relatively small, this evaluation process was feasible and practicable.
The great majority of points are lost in part D “Health and comfort”. In particular:

1. For what concerns the criterion “optimized Daylight”, LEED do not consider acoustic criteria, so no calculus is available at the moment on this issue.
2. Regarding “Thermal comfort in summer”, even if T upper limit has been raised to 27°C (in order to consider higher summer temperature in Italian situation), the upper allowed temperature is overshoot for the 16.4 % of time. In Mediterranean countries it is quite difficult that upper temperature is overshoot less than 5% of time in summer, so this limit should be raised even taking into account only the effective period of usage.
3. Considering “Daylight optimized”, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area, that is effectively a too severe request. Being the Daylight factor 4,98%, we considered fulfilled the criterion.

f) About the planning process

The building was designed to obtain a Leed NC 2.2 Silver certification, corresponding to a range of 37- 43 points.

For what concerns the planning process, it has been done using LEED as reference and not ENERBUILD tool, that has been applied in a second moment and so it can be considered more an evaluation tool than a planning tool. However, the following considerations about ENERBUILD tool can be done:

12. Point A1 is clear and easy to be faced.
13. Point A2 is well defined and the proposed index is easy to be used.
14. Points B1 and B2 are very detailed and well done. All the most important aspects of planning phase are taken into consideration. Each point has a proper reference with LEED tool (see even following detailed considerations).
15. Point B3 has been quite difficult to be done. LCC is a procedure more and more important in the planning phase (together with LCA) and it is important that in ENERBUILD it has a good relevance, but the ISO Standard and the Austrian standard has been difficult to be applied. For this reason, a simplified method has been followed considering the classical value analysis theory.

16. Point B4 is very important concerning human health in indoor spaces. ENERBUILD is quite complete even if the definition of the percentage of structures with ecological declaration is not clear. It could be easier to have reference to European standards and not to local ones. Even a list of most common building components could be useful.
17. Point B5 is of course an important issue and it has clear reference, point by point, with LEED protocol. It is sufficiently clear and not difficult to be faced.
18. Point B6 is clear and very important. Unfortunately, not all the energy and environmental tools consider this aspect.
19. Point C1 to C4. This is the most problematic section of the tool. In fact, we agree that, in order to have comparable results, the same energy calculation tool should be used. However, PHPP is a good tool only if a passive building has been designed, and the pilot building considered is not a passive one. Moreover, cooling demand is often overestimated and low points are given. It is our opinion that other software should be used, even national ones, taking into account that all the partners should agree on some "fixed points" so that final results of the energy calculation could be compared. For example, it is important to consider international standards. But the choice of the energy calculation tool should be free.
20. Point D1: refer to previous comment.
21. Point D2: in this case, it should be better to leave the partner free to consider national legislation and not fixed values. Also the acoustic index used should refer to international standards. In the case of the pilot building considered, calculation were not made so it is quite impossible to calculate the correct indexes.
22. Point D3: the point is simple and using the EN standard it is easy to calculate. Anyway, the 5% of DF required seems to be too high. In our opinion, following LEED specifications, a daylight factor up to a maximum percentage of 2% in 75% of frequently used spaces should be sufficient.
23. Point E1: the procedure for calculating the OI3 index is quite simple and it is an important aspects of building construction.

g) About the building itself

Vigo Rendena town hall is an innovative project of prefabricated wooden building, cutting edge in terms of environmental sustainability and use of renewable energy. In fact, characteristic of this building is the use of traditional building materials – as stone, wood, plaster – and the use of optimization systems of energy performance.
In particular, its specific construction techniques are:

- concrete structure just in the basement, while in remaining floors structure is wooden;
- use of renewable energies such as photovoltaic and heating boiler with wood chips and pellets;
- high internal environmental comfort provided by a forced-air ventilation with heat recovery;
- use of regional materials;
- automatic checks for a reduction in power consumption.

h) About the evaluation process

In the case of small buildings like this, evaluation process is feasible and practicable. The most problematic aspects of the research has been those related to the collection of all necessary documents and information – that sometimes must be too detailed –. For this reason, we chose to perform ENERBUILD evaluation process using data provided by Leed certification protocol. So, we had to verify where these two systems overlap and which Leed credits correspond (even partly) to ENERBUILD criteria and which have been tried for the considered building. However, if there is no correspondence (as in the case of credit D2, and, partly, credit B1) or a Leed credit has not been tried, we considered the correspondent ENERBUILD criterion not satisfied. Section C and criteria B3 and E1 – which have no Leed equivalent – are instead calculated separately, according to the instructions of the manual.

Here follows the comparison between ENERBUILD criteria and Leed credits tried for this building.

A Quality of location and facilities

A1 Access to public transport network

Leed evaluation process requires easy access to public transportation through SS Credit 4.1 "Alternative Transportation: Public Transportation Access". To get this criterion, Leed and ENERBUILD evaluations use very similar approaches, both requiring to place the project near an existing public bus or train stop. However, compared to Leed certification, ENERBUILD evaluation process also requires a transport minimum hourly frequency.

A2 Ecological quality of site

There is no direct correspondence between LEED credits and ENERBUILD A2 criterion. However, it is possible to calculate area's ecological index by Leed certification, and in particular through SS Credit 1 "Site Selection" and through SS Credit 2 "Density & Community Connectivity".

B Process and planning quality

B1 Decision making and determination of goals – B2 Formulation of verifiable objectives for energetic and ecological measures

Decision making is defined by Leed evaluation process through an initial diagram and through two reports ("Basis Of Design", BOD, and "Owner's Project Requirements", OPR, defined by EA Prerequisite 1, "Fundamental Commissioning of the Building") that contain the objectives to be pursued. Checklist is also a Leed tool which allows to evaluate the project team's choices and to get B1 and B2 ENERBUILD Criteria.

In particular, for credit B1 assessment important criteria are SSPr1, SSPr2, SSC2, SSC4, SSC5 into the SS Section "Sustainable Sites", criteria EAPr2, EAC1 into the EA Section "Energy and Atmosphere", criteria MR C4, MRC 5, MRC6 into the MR Section "Materials and resources" and IEQ Criterion 4 into the EQ Section "Indoor Environmental Quality".

B2 credit is met by two Leed reports – BOD and OPR – defined respectively by the owner and by the design team. These tools are a necessary prerequisite for Leed certification and so B2 criterion is always get.

B3 Standardized calculation of the economic efficiency

Standardized calculation of the economic efficiency (LCC) is not considered by Leed certification and so it was calculated separately.

B4 Product management – Use of low-emission products

Product management is defined into the MR Section "Materials and Resources" and into the EQ Section" Indoor Environmental Quality" through different criteria. In particular, Leed evaluation process requires to use materials with recycled content, rapidly renewable and regional as defined, respectively, by MR Criterion 4, C5 and C6.

However, Leed evaluation process requires full documentation of all materials used but it requires Low-Emitting Materials only for building's interior and in particular, for adhesives and sealants, paints, and coating, carpet systems composite wood, agrifiber products (and according to the manual "Leed for School", furniture) as required by Credits 4.1, C4.2, C4.3, C4.4 into the EQ Section.

Therefore, although the correlation between Leed evaluation and credit B4 is not direct, it is possible to compare these two protocols and ENERBUILD criterion B4 is get if all Leed criteria have been tried.

B5 Planning support for energetic optimization

B5 criterion requires to satisfy the following conditions (each associated with 5 points):

- design by specifying destination, size, frequency and intensity of use of the rooms, and their internal temperatures. This criterion is quite similar to Leed Credit EA1, because building energy simulation requires the same information;
- design of air flow room according to hygiene requirements, as required into the EQ Section, "Indoor Environmental Quality", and in particular by EQPr1 (that requires to establish minimum indoor air quality);
- identification of internal heat sources, condition necessary to develop building energy simulation and so condition already required by Leed Credit EA1;
- calculation of thermal bridges by means of a default value of 0.03 W / (m2 K) and detailed verification of thermal bridges. There is no correspondence to Leed certification system;
- description of energy parameters in the contract, as required by Leed EA Pr1;
- verification of energy aspects of the tenders with the requirements of the contract, condition satisfied because it gets EA Prerequisite 1;
- visits to the site to support local management about energy issues, required also by Credit EA C5;
- provide to conduct the Blower Door test, that is an option required by Leed certification just in case of residential buildings, through EQ Prerequisite 2 (Option 3);
- measure of ventilation system, as required by Leed evaluation with EA Credit 1;
- hydraulic balancing of the heating, as required by Leed EA Credit 1;
- update of the calculations of energy requirements at the end of the construction and conduct a blower door test as final control. This criterion get Leed EA Credit 1;
- verification of energy requirements at the end of the work, as required by Leed EA Credit 5 "Measuring and verification".

B6 Information for users

Leed evaluation process requires to develop an use and operating manual just if you want to get the EA Credit 3 "Enhanced Commissioning". So, its development – very rare – depends on project team's choice, on building's complexity and on its destination.

C Energy & Utilities (Passive house)

C1 Specific heating demand (PHPP) – C2 Specific cooling demand (PHPP) – C3 Primary energy demand (PHPP) – C4 C_O2-emissions (PHPP)

Section C on the energy requirements (C1, C2, C3) can not be compared directly with EA Leed section "Energy and Atmosphere". In fact, ENERBUILD certification system requires an analysis developed by using Phpp software, whereas Leed evaluation process just requires (EA C1) to observe the minimum prescriptive measures. Also, if you want to obtain the maximum score, Leed requires to develop a dynamic simulation (EA C1, Option 2) that involves comparison of the building with a basic model defined by prescriptive measures (ASHRAE 90.1.2007 norm, Appendix G).

B2.3 Photovoltaic system

The ENERBUILD criterion is comparable to EA Credit 2 "On-site Renewable Energy". However, Leed criterion aims at increasing not only photovoltaic energy, but all renewable such as solar, wind, geothermal, biomass and bio-gas energy.

D Health and Comfort

D1 Thermal comfort in summer

Although into the EQ Leed section credits EQ C7.2 and EQ C7.1 define all the requirements for summer thermal comfort, it is necessary to use Phpp software to calculate value hθ (percentage overshoot the maximum allowable temperature in summer) required by

ENERBUILD certification system. Therefore, D1 ENERBUILD criterion doesn't find a match with Leed certification.

D2 Ventilation – non energetic aspects
Leed evaluation process defines the requirements for sound insulation just when the building is a school. Again, however, there is no correspondence to ENERBUILD evaluation process: Leed certification requires to achieve in classrooms a background noise up to a maximum level of 45 dBA, equivalent to standards required by ANSI S12.60/2002 (EQ Pr3); instead, ENERBUILD requires not only a background up to a maximum level of 30 dBA, but also that sound pressure level (not exceeding 20 dB) is evaluated with the weighting curve "C". In particular, this second aspect is not considered by Leed evaluation process and so these two evaluation processes are not comparable.

D3 Daylight optimized (+ lightening optimized)
D3 criterion is similar to Leed EQ Credit 8.1 "Daylight and views". However, Leed certification considers only regularly occupied spaces, and it requires daylight factor up to a maximum percentage of 2% in 75% of these spaces, while according to ENERBUILD certification this factor has to be as possible equal to 5%, and superior to 2%, calculated on entire area.

E Building materials and construction
E1 OI3TGH-lc ecological index of the thermal building envelope
Although Leed evaluation process rewards the use of ecological materials (MR C4, MR C5 and MR C6), Leed doesn't require the calculation of ecological index of thermal building envelope. So, ENERBUILD E1 criterion doesn't find a match with Leed certification system.

5 Suggestions for improvement of the ENERBUILD-Tool

- Mandatory criteria shouldn't have score;
- Criterion B3: l*ife cycle cost analysis is a mandatory criterion, but in practice LCC are rarely calculated. moreover, prescriptions and* assumptions for profitability calculation are not clear and ISO 15686-5 is not sufficient;
- Section C: some PHPP layers require information too detailed and very difficult to collect for already designed and built constructions, especially if nor passive buildings;
- Criterion D3: only regularly occupied spaces and not entire area should be considered in order to calculate the average daylight factor.
-

PP9 Provincia di Alessandria: School complex, 1st section, Ovada (finished)

(33) PP9 Provincia di Alessandria: School complex Polo Scolastico Ovada Lotto, 1st section, Ovada (finished)

1 Basic information about the building

Name of the building	Polo Scolastico Ovada lotto I
Address of the building	Strada Voltri n. 27
Owner/investor	Provincia di Alessandria
Year of construction	2006-2007
Building type	Massive construction
Building method	Concrete framework and brick wall
Number of buildings	1
Number of levels above earth	3
Number of levels underground	0
Kind of the public use	Educational use: high school
Effective area for public use in m ² (net)	1960,00
Additional private uses	0,00
Effective area for private use in m ² (net)	0,00
Total effective area in m ²	1960,00
Source of energy for heating	Methane
Heating system	Methane boiler
Water heating system	Solar Panels
Date of the building evaluation	20 July 2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Environment Park S.p.A.
Contact person: Arch. Stefano Dotta / Arch. Chiara Bianco
Telephone: +39 011/2257262 Email: stefano.dotta@envipark.com / chiara.bianco@envipark.com

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: Volume 6.000 m³ 15 kWh m³; Volume 8.000 m³ 13,5 kWh m³; Volume 10.000 m³ 11,0 kWh m³

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	87,5
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	37,5
B		Process and planning quality		max. 200	80
B	1	Decision making and determination of goals		25	15
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	0
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	20
B	5	Planning support for energetic optimization		60	20
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	82
C	1	Specific heating demand (PHPP)	M	100	0
C	2	Specific cooling demand (PHPP)	M	100	82
C	3	Primary energy demand (PHPP)	M	125	0
C	4	CO2-emissions (PHPP)		50	0
D		Health and Comfort		max. 250	165
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	133
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	133
Sum				max. 1000	547,5

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
ENERBUILD-Tool has been one interesting trans-national system for knowing many energy technicians and experts from other Countries, and also from different Italian Areas, and so for comparing the level of designing and working in Provincia di Alessandria.

b) About the planning process
ENERBUILD Tool use has not been simple for Provincia di Alessandria, because technicians are involved in calculations with PHPP which has not known in our design and working studios.
In particular we have noticed strong differences between common Italian evaluations and C2, C3, C4 and E1 values provided by ENERBUILD Tool.

c) About the building itself
Provincia di Alessandria has been involved in ENERBUILD-Tool / WP6 for 7 samples, 3 of which are about new pubblic buildings. For these 3 buildings the planning process required by ENERBUILD Tool is similar to that one used in common administration process in Italy.

d) About the evaluation process
ENERBUILD Tool can't be generally used in our regions, with particular references to materials and ecological index catalogue by IBO BOOK which provides only for Austrian or German areas.
In particular LCA – Life Circle Assessment-, about which OI3 is evaluated, is only based over Austrian data basis.

5 Suggestions for improvement of the ENERBUILD-Tool

ENERBUILD Tool could be an additional tool, not unique, in evaluating public building – offices, schools, gymnasiums – towards local tools.
ENERBUILD Tool / Version 1.7 – 25 November 2010 – has already been studied for transnational uses, in each case with all limits before explained.

(34) PP9 Provincia di Alessandria: School complex, 2nd section, Ovada (?)

Evaluation ENERBUILD-Tool
Polo Scolastico Ovada Lotto II

1 Basic information about the building

Name of the building	Polo Scolastico Ovada Lotto II
Address of the building	Via Voltri
Owner/investor	Provincia di Alessandria
Year of construction	2012 probably
Building type	Massive construction
Building method	Concrete framework and brick wall
Number of buildings	1
Number of levels above earth	3
Number of levels underground	0
Kind of the public use	Educational use: high school
Effective area for public use in m ² (net)	2253
Additional private uses	--
Effective area for private use in m ² (net)	--
Total effective area in m ²	2253
Source of energy for heating	Electric energy
Heating system	Heat pump
Water heating system	Heat pump + solar collectors
Date of the building evaluation	20 July 2011

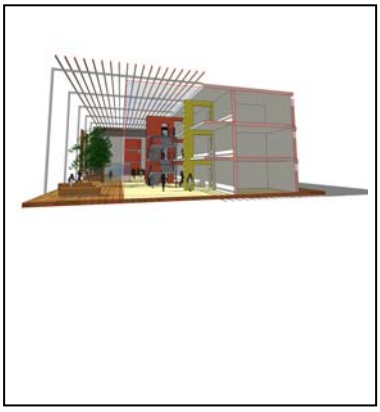
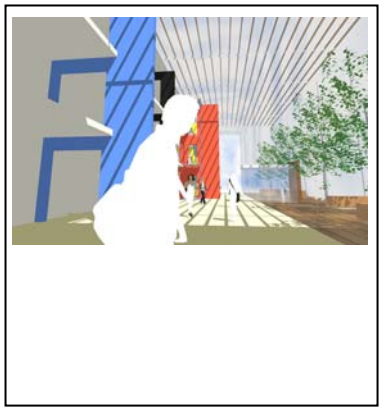
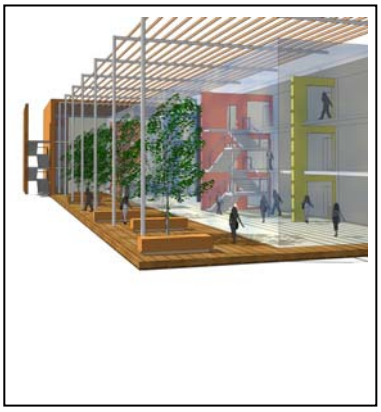
2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Environment Park S.p.A.
Contact person: Arch. Stefano Dotta / Arch. Chiara Bianco
Telephone: +39 011/2257262 Email: stefano.dotta@envipark.com

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: Volume 6.000 m³ 15 kWh m³; Volume 8.000 m³ 13,5 kWh m³; Volume 10.000 m³ 11,0 kWh m³

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	87,5
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	37,5
B		Process and planning quality		max. 200	170
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	20
B	5	Planning support for energetic optimization		60	40
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	97,5
C	1	Specific heating demand (PHPP)	M	100	10
C	2	Specific cooling demand (PHPP)	M	100	60
C	3	Primary energy demand (PHPP)	M	125	0
C	4	CO2-emissions (PHPP)		50	27,5
D		Health and Comfort		max. 250	75
D	1	Thermal comfort in summer		150	0
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	172
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	172
Sum				max. 1000	602

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
ENERBUILD-Tool has been one interesting trans-national system for knowing many energy technicians and experts from other Countries, and also from different Italian Areas, and so for comparing the level of designing and working in Provincia di Alessandria.

b) About the planning process
ENERBUILD-Tool use has not been simple for Provincia di Alessandria, because technicians are involved in calculations with PHPP which has not known in our design and working studios.
In particular we have noticed strong differences between common Italian evaluations and C2, C3, C4 and E1 values provided by ENERBUILD Tool.

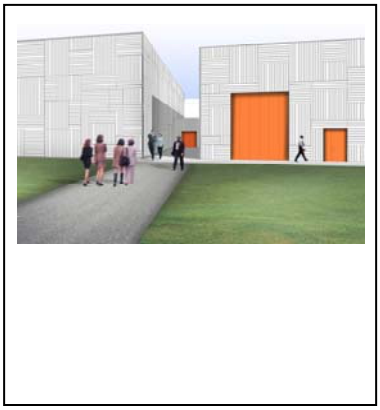
c) About the building itself
Provincia di Alessandria has been involved in ENERBUILD-Tool / WP6 for 7 samples, 3 of which are about new pubblic buildings. For these 3 buildings the planning process required by ENERBUILD-Tool is similar to that one used in common administration process in Italy.

d) About the evaluation process
ENERBUILD Tool can't be generally used in our regions, with particular references to materials and ecological index catalogue by IBO BOOK which provides only for Austrian or German areas.
In particular LCA – Life Circle Assessment-, about which OI3 is evaluated, is only based over Austrian data basis.

5 Suggestions for improvement of the ENERBUILD-Tool

ENERBUILD-Tool could be an additional tool, not unique, in evaluating public building – offices, schools, gymnasiums – towards local tools.
ENERBUILD-Tool / Version 1.7 – 25 November 2010 – has already been studied for transnational uses, in each case with all limits before explained.

(35) PP9 Provincia di Alessandria: School complex, 3rd section, Ovada gymnasium and laboratory (planning/building phase)



1 Basic information about the building

Name of the building	Technical High School Workshops and Gym Buildings
Address of the building	Via Pastorino 12 – 15076 Ovada (AL) - Italy
Owner/investor	Provincia di Alessandria
Year of construction	Forecast 2012
Building type	Public school service annex
Building method	Precast concrete
Number of buildings	2
Number of levels above earth	1
Number of levels underground	0
Kind of the public use	Education, sport
Effective area for public use in m ² (net)	2.575,70
Additional private uses	None
Effective area for private use in m ² (net)	0
Total effective area in m ²	2.575,70
Source of energy for heating	Remote heating plant
Heating system	Underfloor low temperature
Water heating system	Solar heating 60% - Heating excanger
Date of the building evaluation	July 2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation:
Contact person: Ing. Fabio Leccacorvi – Studio Associato Fraternali Quattroccolo Architetti
Telephone: 011-593302 Email: fraquarc@gmail.com

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: Volume 6.000 m³ 15 kWh m³; Volume 8.000 m³ 13,5 kWh m³; Volume 10.000 m³ 11,0 kWh m³

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	87,5
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	37,5
B		Process and planning quality		max. 200	180
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	25
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	20
B	5	Planning support for energetic optimization		60	45
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	71,5
C	1	Specific heating demand (PHPP)	M	100	23
C	2	Specific cooling demand (PHPP)	M	100	10
C	3	Primary energy demand (PHPP)	M	125	0
C	4	CO2-emissions (PHPP)		50	38,5
D		Health and Comfort		max. 250	145
D	1	Thermal comfort in summer		150	45
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	85
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	85
Sum				max. 1000	569

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
ENERBUILD-Tool has been one interesting trans-national system for knowing many energy technicians and experts from other Countries, and also from different Italian Areas, and so for comparing the level of designing and working in Provincia di Alessandria.

b) About the planning process
ENERBUILD-Tool use has not been simple for Provincia di Alessandria, because technicians are involved in calculations with PHPP which has not known in our design and working studios.
Also estimation of OI3, ecological index is not normally present in any evaluation. In particular we have noticed strong differences between common Italian rate of evaluations and C2, C3, C4 and E1 values provided by ENERBUILD-Tool.

c) About the building itself
Provincia di Alessandria has been involved in ENERBUILD-Tool / WP6 for 7 samples, 3 of which are about new pubblic buildings. For these 3 buildings the planning process required by ENERBUILD-Tool is similar to that one used in common administration process in Italy.

d) About the evaluation process
ENERBUILD-Tool can't be generally used in our regions, with particular references to materials and ecological index catalogue by IBO BOOK which provides only for Austrian or German areas.
In details LCA – Life Circle Assessment-, about which OI3 is evaluated, is only based over Austrian data basis.

5 Suggestions for improvement of the ENERBUILD-Tool

ENERBUILD-Tool could be an additional tool / not unique/ in evaluating public building – offices, schools, gymnasiums – towards local tools.
ENERBUILD-Tool / Version 1.7 – 25 November 2010 – has already been studied for transnational uses, in each case with all limits before explained.

(36) PP9 Provincia di Alessandria: Lyceum secondary school, Peano Tortona - Enlargement (finished)

1 Basic information about the building

Name of the building	Liceo Peano
Address of the building	Via Vittorio Veneto 3 Tortona (Alessandria)
Owner/investor	Provincia di Alessandria
Year of construction	2006
Building type	Concrete structure
Building method	Traditional
Number of buildings	1 (school campus expansion, with 6 classrooms on three floors, 2 rooms per floor)
Number of levels above earth	3
Number of levels underground	0
Kind of the public use	High School
Effective area for public use in m ² (net)	313
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	313
Source of energy for heating	Methane
Heating system	Tradiotional with radiators
Water heating system	Methane boiler
Date of the building evaluation	20th july 2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Collegio Costruttori ANCE Alessandria
Contact person: Claudio Mazzetto, Stefano Ponzano
Telephone:+390131265724 Email: area.tecnica@cce.al.it

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: Volume 6.000 m³ 15 kWh m³; Volume 8.000 m³ 13,5 kWh m³; Volume 10.000 m³ 11,0 kWh m³

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	87.5
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	37.5
B		Process and planning quality		max. 200	104
B	1	Decision making and determination of goals		25	14
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	20
B	5	Planning support for energetic optimization		60	25
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	82
C	1	Specific heating demand (PHPP)	M	100	0
C	2	Specific cooling demand (PHPP)	M	100	82
C	3	Primary energy demand (PHPP)	M	125	0
C	4	CO2-emissions (PHPP)		50	0
D		Health and Comfort		max. 250	132
D	1	Thermal comfort in summer		150	52
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	30
E		Building materials and construction		max. 200	191.65
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	191.65
Sum				max. 1000	597.10

4 Conclusions from the building evaluation with the ENERBUILD-Tool

Generally
ENERBUILD-Tool has been one interesting trans-national system for knowing many energy technicians and experts from other Countries, and also from different Italian Areas, and so for comparing the level of designing and working in Provincia di Alessandria.

Provincia di Alessandria has been involved in ENERBUILD-Tool / WP6 for 7 samples, 3 of which are about new pubblic buildings. For these 3 buildings the planning process required by ENERBUILD-Tool is similar to that one used in common administration process in Italy.

ENERBUILD-Tool use has not been simple for Provincia di Alessandria, because technicians are involved in calculations with PHPP which has not known in our design and working studios.
In particular we have noticed strong differences between common Italian evaluations and C2, C3, C4 and E1 values provided by ENERBUILD-Tool.

ENERBUILD-Tool can't be generally used in our regions, with particular references to materials and ecological index catalogue by IBO BOOK which provides only for Austrian or German areas.

In particular LCA – Life Circle Assessment-, about which OI3 is evaluated, is only based over Austrian data basis.

5 Suggestions for improvement of the ENERBUILD-Tool

ENERBUILD-Tool could be an additional tool / not unique/ in evaluating public building – offices, schools, gymnasiums – towards local tools.
ENERBUILD-Tool / Version 1.7 – 25 November 2010 – has already been studied for transnational uses, in each case with all limits before explained.

(37) PP9 Provincia di Alessandria: Lyceum secondary school, Peano Tortona – New Gymnasium (finished)

1 Basic information about the building

Name of the building	Liceo Peano New Gymnasium
Address of the building	Via Vittorio Veneto 3 Tortona (Alessandria)
Owner/investor	Provincia di Alessandria
Year of construction	2007
Building type	Laminated wood
Building method	Traditional
Number of buildings	1
Number of levels above earth	1
Number of levels underground	0
Kind of the public use	Gymnasium
Effective area for public use in m ² (net)	275
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	275
Source of energy for heating	Methan
Heating system	Underfloor heating
Water heating system	Traditional
Date of the building evaluation	20/07/2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Collegio Costruttori ANCE Alessandria
Contact person: Claudio Mazzetto, Stefano Ponzano
Telephone:+390131265724 Email: area.tecnica@cce.al.it

Temperature for thermal comfort in summertime: 26 °C
Local limits for heating demand: Volume 6.000 m³ 15 kWh m³; Volume 8.000 m³ 13,5 kWh m³; Volume 10.000 m³ 11,0 kWh m³

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	87.5
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	37.5
B		Process and planning quality		max. 200	115
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	20
B	5	Planning support for energetic optimization		60	25
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	10
C	1	Specific heating demand (PHPP)	M	100	0
C	2	Specific cooling demand (PHPP)	M	100	10
C	3	Primary energy demand (PHPP)	M	125	0
C	4	CO2-emissions (PHPP)		50	0
D		Health and Comfort		max. 250	152
D	1	Thermal comfort in summer		150	52
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	182.80
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	182.80
Sum				max. 1000	547.30

4 Conclusions from the building evaluation with the ENERBUILD-Tool

Generally
ENERBUILD-Tool has been one interesting trans-national system for knowing many energy technicians and experts from other Countries, and also from different Italian Areas, and so for comparing the level of designing and working in Provincia di Alessandria.

Provincia di Alessandria has been involved in ENERBUILD-Tool / WP6 for 7 samples, 3 of which are about new pubblic buildings. For these 3 buildings the planning process required by ENERBUILD-Tool is similar to that one used in common administration process in Italy.

ENERBUILD-Tool use has not been simple for Provincia di Alessandria, because technicians are involved in calculations with PHPP which has not known in our design and working studios.

In particular we have noticed strong differences between common Italian evaluations and C2, C3, C4 and E1 values provided by ENERBUILD-Tool.

ENERBUILD-Tool can't be generally used in our regions, with particular references to materials and ecological index catalogue by IBO BOOK which provides only for Austrian or German areas.

In particular LCA – Life Circle Assessment-, about which OI3 is evaluated, is only based over Austrian data basis.

5 Suggestions for improvement of the ENERBUILD-Tool

ENERBUILD-Tool could be an additional tool / not unique/ in evaluating public building – offices, schools, gymnasiums – towards local tools.
ENERBUILD Tool / Version 1.7 – 25 November 2010 – has already been studied for transnational uses, in each case with all limits before explained.

(38) PP9 Provincia di Alessandria: Alessandria Construction Building, Palazzo dell'Edilizia (planning/building phase)

1 Basic information about the building

Name of the building	Palazzo dell'Edilizia – Designer : Arch Daniel Libeskind
Address of the building	Via Marengo, near of Napoleone's Platano
Owner/investor	Sistema Edile di Alessandria
Year of construction	2011
Building type	Terziary Building (offices and school)
Building method	Reinforced concrete frame and external insulation
Number of buildings	1
Number of levels above earth	4
Number of levels underground	1
Kind of the public use	Educational use, offices and conference rooms
Effective area for public use in m ² (net)	0
Additional private uses	-
Effective area for private use in m ² (net)	4.255,43
Total effective area in m ²	4.255,43
Source of energy for heating	Electric energy and geothermal energy
Heating system	Heat pump 277 kW
Water heating system	Heat pump
Date of the building evaluation	20/07/2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Collegio Costruttori ANCE Alessandria

Contact person: Claudio Mazzetto, Stefano Ponzano

Collaborazione: arch. Daniela Demartini

Telephone:+390131265724 Email: area.tecnica@cce.al.it

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	**57,50**
A	1	Access to public transport network		50	20
A	2	Ecological quality of site		50	37,50
B		Process and planning quality		max. 200	**185**
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	20
B	5	Planning support for energetic optimization		60	55
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	**230**
C	1	Specific heating demand (PHPP)	M	100	100
C	2	Specific cooling demand (PHPP)	M	100	0
C	3	Primary energy demand (PHPP)	M	125	85
C	4	CO2-emissions (PHPP)		50	45
D		Health and Comfort		max. 250	**175**
D	1	Thermal comfort in summer		150	75
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	**132**
E	1	$OI3_{TGH-Ic}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	132
Sum				max. 1000	**779,50**

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
the evaluation was quite laborious for the amount of information that was necessary to find and sometimes difficult for the foreign laws with which we had to compare.

b) About the planning process
for the evaluation of the planning process is essential to have written documentation produced during the entire design process that does not always exist. Some criteria have therefore been discussed to see if some types of available documents (minutes, reports, etc. ..) could be considered suitable.

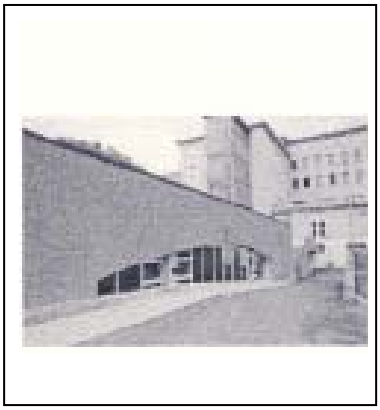
c) About the building itself
the size of the building project, important both in terms of size and shapes, technological solutions and systems adopted, helped make quite complex to evaluate

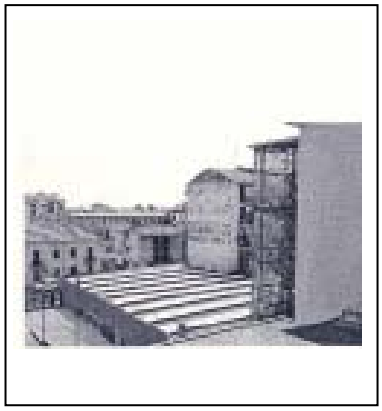
d) About the evaluation process
About the evaluation process, in addition to the comments contained in letter b), there were also critical of the following criteria:
B3: the formula given for the simplified calculation of the cost of the life cycle was not immediately clear because of lack of methodological information attached;
E1: it was quite complicated to use the software for calculating ECOSOFT not having been provided a user manual of the program.

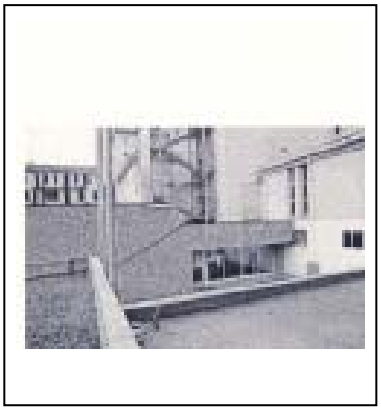
5 Suggestions for improvement of the ENERBUILD-Tool

We believe it's basic to provide to all technical ENERBUILD compilers and users of related software (suggested or required by the catalog) all indispensable instruments so that the response criteria may be unique, comparable and therefore not susceptible to subjective free interpretation. To this end, for example, would be useful to attach to the catalog of criteria ENERBUILD user manuals for suggested softwares or cited laws's extracts, if foreig

(39) PP09 Provincia di Alessandria: I.T.I. “Sobrero” Gymnasium – Casale M.to (AL) (finished)







1 Basic information about the building

Name of the building	I.T.I.S. “Sobrero”
Address of the building	Via Candiani d’Olivola n. 19 – Casale M.to (AL)
Owner/investor	Provincia di Alessandria
Year of construction	2005
Building type	Gymnasium
Building method	Traditional
Number of buildings	1
Number of levels above earth	1
Number of levels underground	2
Kind of the public use	Gymnasium
Effective area for public use in m ² (net)	
Additional private uses	Clubs
Effective area for private use in m ² (net)	
Total effective area in m ²	
Source of energy for heating	Methane
Heating system	At floor
Water heating system	Boiler
Date of the building evaluation	July 20th 2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: **Technical Building Office / Provincia di Alessandria**
Contact person: **Dott. Ing. Piergiuseppe A. Dezza**
Telephone: **+39 0131 304600** Email: piergiuseppe.dezza@provincia.alessandria.it

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	100
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	104
B	1	Decision making and determination of goals		25	14
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	20
B	5	Planning support for energetic optimization		60	25
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	116
C	1	Specific heating demand (PHPP)	M	100	0
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	0
C	4	CO2-emissions (PHPP)		50	16
D		Health and Comfort		max. 250	145
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	30
E		Building materials and construction		max. 200	175
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	175
Sum				max. 1000	640

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
Enerbuild Tool has been one interesting trans-national system for knowing many energy technicians and experts from other Countries, and also from different Italian Areas, and so for comparing the level of designing and working in Provincia di Alessandria.

b) About the planning process
Provincia di Alessandria has been involved in Enerbuild Tool / WP6 for 7 samples, 3 of which are about new pubblic buildings. For these 3 buildings the planning process required by Enerbuild Tool is similar to that one used in common administration process in Italy.

c) About the building itself
Enerbuild Tool use has not been simple for Provincia di Alessandria, because technicians are involved in calculations with PHPP which has not known in our design and working studioso In particular we have noticed strong differences between common Italian evaluations and C2, C3, C4 and E1 values provided by Enerbuild Tool.

d) About the evaluation process
Enerbuild Tool can't be generally used in our regions, with particular references to materials and ecological index catalogue by IBO BOOK which provides only for Austrian or German areas. In particular LCA - Life Circle Assessment-, about which 013 is evaluated, is only based over Austrian data basis.

5 Suggestions for improvement of the ENERBUILD-Tool

EnerbuildTool eould be an additionaltool / not unique/ in evaluatingpublie building - offiees, schools,gymnasiums- towardsloeal tools.
Enerbuild Tool / Version 1.7 - 25 November 2010 - has already been studied for transnational uses, in eaeh ease with alllimits before explained.

(40) PP10 EURAC - Bozen: Kindergarten Brunneck, Reischach (finished)

1 Basic information about the building

Name of the building	Kindergarden Brunneck
Address of the building	Hans Theodor Niederbacher Straße 4; 39031 Bruneck/Reischach (Bz) Italy
Owner/investor	Municipality of Brunneck
Year of construction	2008-2010
Planner	Arch. Georg Niederwieser, Ing. Peter Auer
Building type	Wood construction with prefabricated wooden frames.
Building method	Wooden frame with mineral wool insulation and external cork insulation.
Number of buildings	1
Number of levels above earth	2
Number of levels underground	1
Kind of the public use	Kindergarden
Effective area for public use in m ² (net)	983 m²
Additional private uses	/
Effective area for private use in m ² (net)	/
Total effective area in m ²	983 m²
Source of energy for heating	Biomass and gas delivered by district heating
Heating system	District heating
Water heating system	District heating
Date of the building evaluation	2010

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Eurac research, Institute for Renewable Energy
Contact person: Hannes Mahlknecht
Telephone:0039 0471 055656 Email:hannes.mahlknecht@eurac.edu

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	56
A	1	Access to public transport network		50	6
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	130
B	1	Decision making and determination of goals		25	15
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	25	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	30
B	5	Planning support for energetic optimization		60	55
B	6	Information for users		25	10
C		Energy & Utilities (Passive house)		max. 350	329
C	1	Specific heating demand (PHPP)	M	100	54
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	111
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	21
E		Building materials and construction		max. 200	129
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	129
Sum				max. 1000	755

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The evaluation seems feasible and practicable in an appropriate working time. The most problematic part was to gather all necessary documents and information.

b) About the planning process
Part B, the Process and planning quality was evaluated within an interview with the architect. Written documentations about the single criteria were in part missing.

c) About the building itself
The building was evaluated with 755 points and is placed in the middle field of the ENERBUILD certification.

d) About the evaluation process
Problems during the evaluation problems were met in following:
Criterion B3: The criterion of economic efficiency is a must criterion, but in practice not always economic efficiency is followed for smaller public buildings, like in this example.
Criterion D2: The calculation from Uni EN 12354-5 was not done, but the planners respected principal planning strategies to avoid sound transmissions.

5 Suggestions for improvement of the ENERBUILD-Tool

Some criteria of the catalog could be formulated more precise. For example criteria B1: Division of the competitions into public competitions for architectural ideas and preliminary design, preliminary competition, executive competition, public tendering.
B3: The tool of Frankfurt for calculated the economic efficiency could be added in the appendix.

(41) PP10 EURAC - Bozen: Kindergarten Mühlen, Sand in Taufers (finished)

1 Basic information about the building

Name of the building	Kindergarten Mühlen in Taufers
Address of the building	J.-Beikircher-Allee 28, 39032 Mühlen (Bz) Italy
Owner/investor	Municipality of Sand in Taufers
Year of construction	2007
Planner	Arch. Johanna Niederkofler and Arch. Thomas Winkler
Building type	Massive construction
Building method	Concrete and brick walls with external insulation
Number of buildings	1
Number of levels above earth	2
Number of levels underground	1
Kind of the public use	Educational use: school with multifunctional rooms
Effective area for public use in m ² (net)	1350 m²
Additional private uses	/
Effective area for private use in m ² (net)	/
Total effective area in m ²	1350 m²
Source of energy for heating	Electric energy and geothermal energy
Heating system	Electrical floor heating system, electric post heating of air
Water heating system	Peripheral electric DHW boilers
Date of the building evaluation	2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Eurac research, Institute for Renewable Energy
Contact person: Hannes Mahlknecht
Telephone:0039 0471 055656 Email:hannes.mahlknecht@eurac.edu

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	82
A	1	Access to public transport network		50	32
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	130
B	1	Decision making and determination of goals		25	5
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	30
B	5	Planning support for energetic optimization		60	60
B	6	Information for users		25	15
C		Energy & Utilities (Passive house)		max. 350	336
C	1	Specific heating demand (PHPP)	M	100	76
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	35
D		Health and Comfort		max. 250	140
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	50
E		Building materials and construction		max. 200	129
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	129
Sum				max. 1000	817

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The evaluation seems feasible and practicable in an appropriate working time. The most problematic part was to gather all necessary documents and information. For the evaluation part B, an interview with the planner was done to figure out all information.

b) About the planning process
For the evaluation of the planning process written documentations are required, which we could not gather or do not exist. The architect in this case was directly commissioned by the municipality. The energetic target of the building was fixed in an early planning stage to Climahouse A. Some variants about the heating system were elaborated and especially paid attention to use ecological construction materials.

c) About the building itself
The building was evaluated with 817 points and awards the ENERBUILD silver certification label. This grading is quite realistic and gives a good statement about an ecological overview of the building.

d) About the evaluation process
Problems during the evaluation problems were met in following:
Criterion B3: The economic efficiency was not evaluated within this project by the planners.
Criterion D2: As sound-measurements could not be done, an evaluation was done by interviewing the architect and figuring out the employed measures to avoid sound transmissions of the ventilation machine.

5 Suggestions for improvement of the ENERBUILD-Tool

Criterion D2: A simplified method for calculating the sound transmission should be implemented into the ENERBUILD manual.

(42) PP10 EURAC - Bozen: Elementary school Lajen (finished)

1 Basic information about the building

Name of the building	Elemnentary school Lajon
Address of the building	Ried 141. 39040 Lajen (Bz) Italy
Owner/investor	Municipality of Lajon
Year of construction	2008-2006
Planner	Arch TV Trojer Vonmetz Architekten
Building type	Massive construction
Building method	Concrete walls with external insulation
Number of buildings	1
Number of levels above earth	2
Number of levels underground	0
Kind of the public use	Educational use: school with multifunctional rooms
Effective area for public use in m ² (net)	624,9m²
Additional private uses	/
Effective area for private use in m ² (net)	/
Total effective area in m ²	624,9 m²
Source of energy for heating	Electric energy and geothermal energy
Heating system	Heat pump 8,3kW
Water heating system	Heat pump with puffer store
Date of the building evaluation	2006

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Eurac research, Institute for Renewable Energy
Contact person: Hannes Mahlknecht
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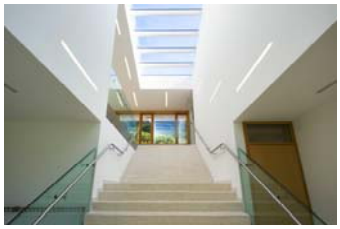
3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	56
A	1	Access to public transport network		50	6
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	140
B	1	Decision making and determination of goals		25	15
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	30
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	50
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	50
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	50
Sum				max. 1000	716



4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The most problematic part was to gather all necessary documents and information. To be able to evaluate the part B of the planning process, an interview with the planner was necessary to figure out all information.

b) About the planning process
For the evaluation of the planning process written documentations are required, which do not always exist. Some topics were discussed and were integrated in the planning although.

c) About the building itself
The building was evaluated with 716 points and awards the ENERBUILD silver certification label. This grading is quite realistic and gives a good statement about an ecological overview of the building.

d) About the evaluation process
Problems during the evaluation problems were met in following:
Criterion B3: The criterion of economic efficiency is a must criterion, but in practice not always economic efficiency is followed for smaller public buildings, like in this example.
Criterion D2: The calculation from Uni EN 12354-5 seems very laborious. Are you doing sound-measurements usually in Vorarlberg?
Criterion D3: Is the average daylight factor meant for the whole surface of the building or only rooms were daylight is necessary (no corridors, technical rooms, WCs)?

5 Suggestions for improvement of the ENERBUILD-Tool

Some criteria of the catalog could be formulated more precise. For example criteria B1: Division of the competitions into public competitions for architectural ideas and preliminary design, preliminary competition, executive competition, public tendering.
B3: The tool of Frankfurt for calculated the economic efficiency could be added in the appendix.

(43) PP10 EURAC - Bozen: Rest Home Lajen (finished)

Picture outside

1 Basic information about the building

Name of the building	Rest Home Lajon
Address of the building	Ried 141. 39040 Lajen (Bz) Italy
Owner/investor	Municipality of Lajon
Year of construction	2008-2010
Planner	De Biais & Comploi Architekten
Building type	Mixed construction with bearing reinforced concrete columns and reinforced concrete kerns
Building method	Concrete walls and brick-walls with external insulation
Number of buildings	1
Number of levels above earth	4
Number of levels underground	2
Kind of the public use	Rest home
Effective area for public use in m ² (net)	
Additional private uses	/
Effective area for private use in m ² (net)	/
Total effective area in m ²	m²
Source of energy for heating	Electric energy and geothermal energy
Heating system	Heat pump 8,3kW
Water heating system	Heat pump with puffer store
Date of the building evaluation	2010

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Eurac research, Institute for Renewable Energy
Contact person: Hannes Mahlknecht
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3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	56
A	1	Access to public transport network		50	6
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	165
B	1	Decision making and determination of goals		25	20
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	55
B	5	Planning support for energetic optimization		60	55
B	6	Information for users		25	15
C		Energy & Utilities (Passive house)		max. 350	302
C	1	Specific heating demand (PHPP)	M	100	87
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	65
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	117
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lightening optimized)		50	27
E		Building materials and construction		max. 200	132
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	132
Sum				max. 1000	772

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
The evaluation could be done with some efforts as the building is quite large. Most of all necessary information was obtained by the municipality and the architect whit whom a meeting and discussion about the planning process was done.

b) About the planning process
The planning process was evaluated with oral information from the planers. He informed about the difficulties during the planning phases and described that all decisions were taken together with the municipality. The energetically goals were defined in an early planning stage and minimal changings in variants were planned. During the construction phase all used materials were controlled and finally held a training course to the maintenance staff of the building.

c) About the building itself
The building was evaluated with 772 points and is placed in the upper field of the ENERBUILD certification corresponding to a silver certification label.

d) About the evaluation process
Problems during the evaluation problems were met in following:
Criterion B3: Economic efficiency was not evaluated
Criterion D2: The evaluation of the sound transmissions was evaluated within an interview with the architect by checking the requirements to avoid sound transmission of ventilation machines and the employed solution sets.

5 Suggestions for improvement of the ENERBUILD-Tool

D3: The daylight calculation with the described procedure of the manual is not always applicable, for example when having spaces with windows oriented in different orientations. Maybe a daylight calculation of the most important spaces with the ad of a simple software calculation (freeware Dialux or Relux) gives a more realistic result of the used spaces.

(44) PP13 ZVDK Schweiz: Administrative building EWZ Zermatt (finished)



[Pictures from Lauber IWISA AG]

1 Basic information about the building

Name of the building	Verwaltungsgebäude EWZ Zermatt
Address of the building	Metzggasse 44, CH-3920 Zermatt
Owner/investor	Elektrizitätswerk Zermatt AG (Electric Power Company)
Year of construction	2004-2005
Building type	New administration building with school/ class rooms at 1‘631m a.s.l.
Building method	Massive construction with wooden cladding
Number of buildings	1
Number of levels above earth	5
Number of levels underground	-
Kind of the public use	Administrative and school building
Effective area for public use in m ² (net)	1’852 m^2
Additional private uses	-
Effective area for private use in m ² (net)	-
Total effective area in m ²	1’852 m^2
Source of energy for heating	Electrical heat pump with air ventilation recovery system with additional solar collectors
Heating system	As before; additional PV elements contribute to the coverage of the power consumption
Water heating system	
Date of the building evaluation	2010/2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Lucerne University of Applied Sciences and Arts – Lucerne School of Engineering and Architecture – Competence Center Topology & Foresight Planning in

Architecture, Technikumstrasse 21, CH-6048 Horw

Contact person: C.Lars Schuchert
Telephone: +41 41 349 34 96 Email: lars.schuchert@hslu.ch

Temperature for thermal comfort in summertime: 25°C

Local limits for heating demand: in Switzerland, the local limit for the heating demand is determined by the building's location (mean annual temperature), the building surface-to-heated floor area ratio, and its use. Also the limit differs according to the energy standard. Since the treaded floor area is calculated differently and the basic data is also taken into account differently, the values cannot be directly compared to the values of the calculation via PHPP. (The calculation according to Minergie(-P) standard usually achieve lower values (refer to: Zentrum für Energie und Nachhaltigkeit im Bauwesen. Minergie und Passivhaus: Zwei Gebäudestandards im Vergleich – Schlussbericht. 2002. Page 6)
The limits for this administration building are: New building, administration: 60 kWh/m^{2}a (according to SIA 380/1:2001,converted from 217 MJ/m^2)

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	106
B	1	Decision making and determination of goals		25	16
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	0
B	5	Planning support for energetic optimization		60	50
B	6	Information for users		25	20
C		Energy & Utilities (Passive house)		max. 350	350
C	1	Specific heating demand (PHPP)	M	100	76
C	2	Specific cooling demand (PHPP)	M	100	100
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	65
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	n/a
D	3	Daylight optimized (+ lighting optimized)		50	n/a
E		Building materials and construction		max. 200	53
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	53
Sum				max. 1000	636



[Pictures from Lauber IWISA AG]

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
Retrieving the required information was quite difficult. Different sources had to be requested, reviewed and compared. If further tools are needed as part of the ENERBUILD-Tool evaluation (particularly PHPP and the OI3 calculator), the corresponding data for those tools has to be gathered, determined via auxiliary calculations, or estimated if not available.

b) About the planning process
The information about the planning process of the building, further data concerning the location, health and comfort was requested from architects/ planners of the building using a questionnaire. If available, they kindly provided the relevant information, so the values could be implemented into the ENERBUILD-Tool.

c) About the building itself
Since not all data, which the PHPP calculation would need, could be retrieved, there might be deviations. Also, the Swiss Minergie-P standard consults other floor areas (heated gross floor area) and calculates the demands differently. Thus, a comparison between the results of PHPP and Minergie-P cannot be taken to draw conclusions from. Since the PHPP only accounts to about one third of the possible points of whole ENERBUILD-Tool, those deviations were considered to be insignificant.
Assigning e.g. the value of of “C1 - Specific heating demand”, the target value of 15 kWh/m^{2}a is based on PHPP calculation, while the initial value (local limit for heating demand) is based on other national calculation methods (SIA 380/1). Therefore, determining the score for the ENERBUILD-Tool will most likely always be subject to deviations.

d) About the evaluation process
The relevant information about the building consists of gathered results (e.g. national/ local certification standards) and, thus, calculated values, which depend on their calculation method. This means they cannot be transferred directly into the ENERBUILD-Tool. Tracing them back to their origin to finally use them for PHPP and OI3-Index calculations, which themselves are part of the ENERBUILD-Tool, is quite time-consuming.
Also, the evaluation relies on the help of planners and architects, who need to provide further information which was not relevant for the local certification process (e.g. the “Ecological quality of the site”). If data is missing, there is little room for estimates.

5 Suggestions for improvement of the ENERBUILD-Tool

There could be an option to adjust the maximum score if not all criteria could be evaluated, so that with a potential maximum “800 points” and achieved “600 points”, the overall achievement would still be 75%.
Furthermore, e.g. for “D1 - Thermal comfort in summer” the maximum score cannot be reached without dynamic calculation. Thus, maxing out the potential score, another more complex tool would have to come into consideration. This seems not to be very user friendly, comparing the cost-benefit ratio.
Another suggestion is to clarify the distribution of the score for each portion of the ENERBUILD-Tool. The descriptions how to distribute the points of the “Prescription ENERBUILD-Tool Criteria” are diverse: one uses a formula, while another one has to be interpolated, and a third one needs another complex tool etc. Also “D2 – Ventilation – non energetic aspects” two times lists the same criteria for sound imission measurements while assigning different scores.
Providing a list and overview of the required (sub) tools to convert basic data/ information into scores for the ENERBUILD-Tool would be helpful as a checklist for involved institutions or planners/ architects etc.
The “E1 – $OI3_{THG\text{-}lc}$ ecological index…” uses contradictory indices. All of the following indices are mentioned: $OI3_{TGH\text{-}lc}$, $OI3_{TGH\text{-}BGF}$, $OI3_{TGH\text{-}BGF\ WG\ Ref.}$ → there should be clarification. Maybe also the possibility of (just) calculating the surfaces and their specific OI3 of the construction *without* another tool would help to lighten the process. If Ecosoft is used, the OI3 index for “construction & maintenance” could also be an interesting addition to the broad approach of the ENERBUILD-Tool.

(45) PP13 ZVDK Schweiz: School Building, Eichmatt (finished)


[Hannes Henz]


[Hannes Henz]


[Peter Regli]

1 Basic information about the building

Name of the building	Schulhaus Eichmatt
Address of the building	Eichmattstrasse 11
Owner/investor	6333 Hünenberg See
Year of construction	2009
Building type	New school building with gym at 400m a.s.l.
Building method	Wood and massive construction
Number of buildings	1
Number of levels above earth	3 (the lowest levels is partially underground, ca. 25%)
Number of levels underground	-
Kind of the public use	School
Effective area for public use in m ² (net)	ca. 6’500 m^2
Additional private uses	1 apartment
Effective area for private use in m ² (net)	ca. 160 m^2
Total effective area in m ²	ca. 6’560 m^2
Source of energy for heating	Thermal ground probe with electrical heat pump, mechanical ventilation with heat recovery; additional photovoltaic elements
Heating system	Thermal ground probe with heat pump
Water heating system	
Date of the building evaluation	2010/2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Lucerne University of Applied Sciences and Arts – Lucerne School of Engineering and Architecture – Competence Center Topology & Foresight Planning in

Architecture, Technikumstrasse 21, CH-6048 Horw

Contact person: C.Lars Schuchert
Telephone: +41 41 349 34 96 Email: lars.schuchert@hslu.ch

Temperature for thermal comfort in summertime: 26°C

Local limits for heating demand: in Switzerland, the local limit for the heating demand is determined by the building's location (mean annual temperature), the building surface-to-heated floor area ratio, and its use. Also the limit differs according to the energy standard. Since the treaded floor area is calculated differently and the basic data is also taken into account differently, the values cannot be directly compared to the values of the calculation via PHPP. (The calculation according to Minergie(-P) standard usually achieve lower values (refer to: Zentrum für Energie und Nachhaltigkeit im Bauwesen. Minergie und Passivhaus: Zwei Gebäudestandards im Vergleich – Schlussbericht. 2002. Page 6)
The limits for this school building are:
New building, school: 45 kWh/m^{2}a (according to SIA 380/1:2001, converted from 161 MJ/m^2)

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	76
A	1	Access to public transport network		50	36
A	2	Ecological quality of site		50	40
B		Process and planning quality		max. 200	163
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	18
B	3	Standardized calculation of the economic efficiency	M	40	0
B	4	Product-management - Use of low-emission products		60	50
B	5	Planning support for energetic optimization		60	55
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	50
D		Health and Comfort		max. 250	65
D	1	Thermal comfort in summer		150	65
D	2	Ventilation - non energetic aspects		50	n/a
D	3	Daylight optimized (+ lighting optimized)		50	n/a
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	777


[Hannes Henz]


[Hannes Henz]


[Hannes Henz]

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
Retrieving the required information was quite difficult. Different sources had to be requested, reviewed and compared. If further tools are needed as part of the ENERBUILD-Tool evaluation (particularly PHPP and the OI3 calculator), the corresponding data for those tools has to be gathered, determined via auxiliary calculations, or estimated if not available.

b) About the planning process
The information about the planning process of the building, further data concerning the location, health and comfort was requested from architects/ planners of the building using a questionnaire. If available, they kindly provided the relevant information, so the values could be implemented into the ENERBUILD-Tool. Due to the density of activities in their offices it took more time than estimated to retrieve the information.

c) About the building itself
Since not all data, which the PHPP calculation would need, could be retrieved, there might be deviations. In this particular case the building originally was calculated in two different parts (school and gym) to Swiss standards. The Swiss Minergie-P standard consults other floor areas (heated gross floor area) and calculates the demands differently. Thus, a comparison between the results of PHPP and Minergie-P cannot be taken to draw conclusions from. Since the PHPP only accounts to about one third of the possible points of whole ENERBUILD-Tool, those deviations were considered to be insignificant.
Assigning e.g. the value of of “C1 - Specific heating demand”, the target value of 15 kWh/m^{2}a is based on PHPP calculation, while the initial value (local limit for heating demand) is based on other national calculation methods (SIA 380/1). Therefore, determining the score for the ENERBUILD-Tool will most likely always be subject to deviations.

d) About the evaluation process
The relevant information about the building consists of gathered results (e.g. national/ local certification standards) and, thus, calculated values, which depend on their calculation method. This means they cannot be transferred directly into the ENERBUILD-Tool. Tracing them back to their origin to finally use them for PHPP and OI3-Index calculations, which themselves are part of the ENERBUILD-Tool, is quite time-consuming.
Also, the evaluation relies on the help of planners and architects, who need to provide further information which was not relevant for the local certification process (e.g. the “Ecological quality of the site”). If data is missing, there is little room for estimates.

5 Suggestions for improvement of the ENERBUILD-Tool

There could be an option to adjust the maximum score if not all criteria could be evaluated, so that with a potential maximum “800 points” and achieved “600 points”, the overall achievement would still be 75%.
Furthermore, e.g. for “D1 - Thermal comfort in summer” the maximum score cannot be reached without dynamic calculation. Thus, maxing out the potential score, another more complex tool would have to come into consideration. This seems not to be very user friendly, comparing the cost-benefit ratio.
Another suggestion is to clarify the distribution of the score for each portion of the Enerbuilld-Tool. The descriptions how to distribute the points of the “Prescription ENERBUILD-Tool Criteria” are diverse: one uses a formula, while another one has to be interpolated, and a third one needs another complex tool etc. Also “D2 – Ventilation – non energetic aspects” two times lists the same criteria for sound imission measurements while assigning different scores.
Providing a list and overview of the required (sub) tools to convert basic data/ information into scores for the ENERBUILD-Tool would be helpful as a checklist for involved institutions or planners/ architects etc.
The “E1 – $OI3_{THG-Ic}$ ecological index…” uses contradictory indices. All of the following indices are mentioned: $OI3_{TGH-Ic}$, $OI3_{TGH-BGF}$, $OI3_{TGH-BGF\ WG\ Ref.}$ → there should be clarification. Maybe also the possibility of (just) calculating the surfaces and their specific OI3 of the construction *without* another tool would help to lighten the process. If Ecosoft is used, the OI3 index for “construction & maintenance” could also be an interesting addition to the broad approach of the ENERBUILD-Tool.

(46) PP13 ZVDK Schweiz: Hospital Triemli, Zürich (plannin/building phase)



[Pictures from Stadt Zürich – Amt für Hochbauten]

1 Basic information about the building

Name of the building	Stadtspital Triemli – Neubau Bettenhaus
Address of the building	Birmensdorfer Strasse 497, CH-8063 Zürich
Owner/investor	Stadt Zürich, Amt für Hochbauten
Year of construction	2008-2015
Building type	New hospital building at 460m a.s.l.
Building method	Massive construction
Number of buildings	1 (annex wing to existing building)
Number of levels above earth	15
Number of levels underground	2
Kind of the public use	City hospital
Effective area for public use in m ² (net)	ca. 900 m^2 restaurant/ guest areas ca. 29'000 m^2 patient stations
Additional private uses	-
Effective area for medical use in m ² (net)	ca. 19'400 m^2 medical stations and facilities
Total effective area in m ²	ca. 49'300 m^2
Source of energy for heating	Thermal ground probe with heat pump and biomass (wood) boiler; emergency backup with gas/ oil (biomass, gas/oil backup are also supplying steam for hygienic applications)
Heating system	Thermal ground probe with heat pump (80%, also used for cooling) and biomass (wood) boiler (20%)
Water heating system	Heat pump (100%)
Date of the building evaluation	2010/2011

2 Execution of the building evaluation with the ENERBBUILD tool

Responsible Organisation: Lucerne University of Applied Sciences and Arts – Lucerne School of Engineering and Architecture – Competence Center Topology & Foresight Planning in

Architecture, Technikumstrasse 21, CH-6048 Horw

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Temperature for thermal comfort in summertime: 25°C, the standard room temperature is adjusted to 22°C for hospital buildings according to Swiss SIA 380/1:2009, 3.5.1.2.

Local limits for heating demand: in Switzerland, the local limit for the heating demand is determined by the building's location (mean annual temperature), the building surface-to-heated floor area ratio, and its use. Also the limit differs according to the energy standard. Since the treaded floor area is calculated differently and the basic data is also taken into account differently, the values cannot be directly compared to the values of the calculation via PHPP. (The calculation according to Minergie(-P) standard usually achieve lower values (refer to: Zentrum für Energie und Nachhaltigkeit im Bauwesen. Minergie und Passivhaus: Zwei Gebäudestandards im Vergleich – Schlussbericht. 2002. Page 6)
The limits for this hospital building are:
New building, hospital: 38 kWh/m^{2}a (according to SIA 380/1:2007, converted from 136 MJ/m^2))

3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
A		Quality of location and facilities		max. 100	100
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	50
B		Process and planning quality		max. 200	200
B	1	Decision making and determination of goals		25	25
B	2	Formulation of verifiable objectives for energetic and ecological measures	M	20	20
B	3	Standardized calculation of the economic efficiency	M	40	40
B	4	Product-management - Use of low-emission products		60	55
B	5	Planning support for energetic optimization		60	55
B	6	Information for users		25	25
C		Energy & Utilities (Passive house)		max. 350	350
C	1	Specific heating demand (PHPP)	M	100	85
C	2	Specific cooling demand (PHPP)	M	100	91
C	3	Primary energy demand (PHPP)	M	125	125
C	4	CO2-emissions (PHPP)		50	50
D		Health and Comfort		max. 250	225
D	1	Thermal comfort in summer		150	n/a (150)
D	2	Ventilation - non energetic aspects		50	25
D	3	Daylight optimized (+ lighting optimized)		50	50
E		Building materials and construction		max. 200	104
E	1	$OI3_{TGH-lc}$ ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)		200	15
Sum				max. 1000	979



[Pictures from Stadt Zürich – Amt für Hochbauten]

4 Conclusions from the building evaluation with the ENERBUILD-Tool

a) Generally
Retrieving the required information was quite difficult. Different sources had to be requested, reviewed and compared. If further tools are needed as part of the ENERBUILD-Tool evaluation (particularly PHPP and the OI3 calculator), the corresponding data for those tools has to be gathered, determined via auxiliary calculations, or estimated if not available.

b) About the planning process
The information about the planning process of the building, further data concerning the location, health and comfort was requested from architects/ planners of the building using a questionnaire. If available, they kindly provided the relevant information, so the values could be implemented into the ENERBUILD-Tool.

c) About the building itself
Since not all data, which the PHPP calculation would need, could be retrieved, there might be deviations. Also, the Swiss Minergie-P standard consults other floor areas (heated gross floor area) and calculates the demands differently. Thus, a comparison between the results of PHPP and Minergie-P cannot be taken to draw conclusions from. Since the PHPP only accounts to about one third of the possible points of whole ENERBUILD-Tool, those deviations were considered to be insignificant.
Assigning e.g. the value of “C1 - Specific heating demand”, the target value of 15 kWh/m^{2}a is based on PHPP calculation, while the initial value (local limit for heating demand) is based on other national calculation methods (SIA 380/1). Therefore, determining the score for the ENERBUILD-Tool will most likely always be subject to deviations.

d) About the evaluation process
The relevant information about the building consists of gathered results (e.g. national/ local certification standards) and, thus, calculated values, which depend on their calculation method. This means they cannot be transferred directly into the ENERBUILD-Tool. Tracing them back to their origin to finally use them for PHPP and OI3-Index calculations, which themselves are part of the ENERBUILD-Tool, is quite time-consuming.
Also, the evaluation relies on the help of planners and architects, who need to provide further information which was not relevant for the local certification process (e.g. the “Ecological quality of the site”). If data is missing, there is little room for estimates.

5 Suggestions for improvement of the ENERBUILD-Tool

There could be an option to adjust the maximum score if not all criteria could be evaluated, so that with a potential maximum “800 points” and achieved “600 points”, the overall achievement would still be 75%.
Furthermore, e.g. for “D1 - Thermal comfort in summer” the maximum score cannot be reached without dynamic calculation. Thus, maxing out the potential score, another more complex tool would have to come into consideration. This seems not to be very user friendly, comparing the cost-benefit ratio.
Another suggestion is to clarify the distribution of the score for each portion of the Enerbuilld-Tool. The descriptions how to distribute the points of the “Prescription ENERBUILD-Tool Criteria” are diverse: one uses a formula, while another one has to be interpolated, and a third one needs another complex tool etc. Also “D2 – Ventilation – non energetic aspects” two times lists the same criteria for sound imission measurements while assigning different scores.
Providing a list and overview of the required (sub) tools to convert basic data/ information into scores for the ENERBUILD-Tool would be helpful as a checklist for involved institutions or planners/ architects etc.
The “E1 – $OI3_{THG\text{-}lc}$ ecological index…” uses contradictory indices. All of the following indices are mentioned: $OI3_{TGH\text{-}lc}$, $OI3_{TGH\text{-}BGF}$, $OI3_{TGH\text{-}BGF\ WG\ Ref.}$ → there should be clarification. Maybe also the possibility of (just) calculating the surfaces and their specific OI3 of the construction *without* another tool would help to lighten the process. If Ecosoft is used, the OI3 index for “construction & maintenance” could also be an interesting addition to the broad approach of the ENERBUILD-Tool.