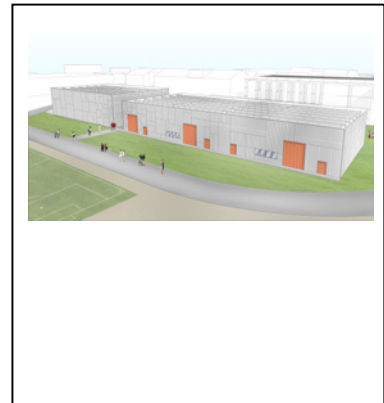
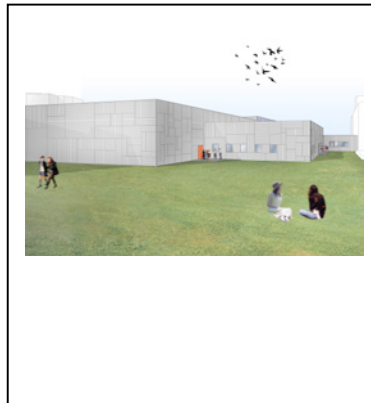


# Evaluation ENERBUILD-Tool – Building in planning phase

## School Whole in Ovada (AL) – III share

### Technical High School Workshops and Gym Buildings



#### 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 <sup>2</sup> (net)	2.575,70
Additional private uses	None
Effective area for private use in m <sup>2</sup> (net)	0
Total effective area in m <sup>2</sup>	2.575,70
Source of energy for heating	Remote heating plant
Heating system	Underfloor low temperature
Water heating system	Solar heating 60% - Heating exchanger
Date of the building evaluation	July 2011

## 2 Execution of the building evaluation with the ENERBUILD tool

Responsible Organisation:

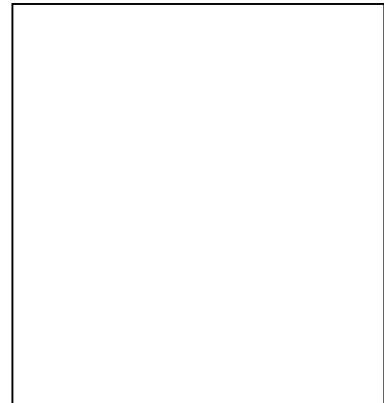
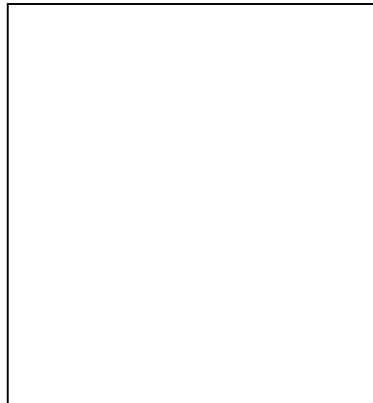
Contact person: Ing. Fabio Leccacorvi – Studio Associato Fraternali Quattrocchio Architetti

Telephone: 011-593302

Email: fraquarc@gmail.com

## 3 Results

Nr.		Title	Must criteria (M)	max. points	evaluated points
<b>A</b>		<b>Quality of location and facilities</b>		<b>max. 100</b>	<b>87,5</b>
A	1	Access to public transport network		50	50
A	2	Ecological quality of site		50	37,5
<b>B</b>		<b>Process and planning quality</b>		<b>max. 200</b>	<b>180</b>
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
<b>C</b>		<b>Energy &amp; Utilities (Passive house)</b>		<b>max. 350</b>	<b>71,5</b>
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	CO <sub>2</sub> -emissions (PHPP)		50	38,5
<b>D</b>		<b>Health and Comfort</b>		<b>max. 250</b>	<b>145</b>
D	1	Thermal comfort in summer		150	45
D	2	Ventilation - non energetic aspects		50	50
D	3	Daylight optimized (+ lightening optimized)		50	50
<b>E</b>		<b>Building materials and construction</b>		<b>max. 200</b>	<b>85</b>
E	1	OI <sub>3</sub> <sub>TGH-ic</sub> ecological index of the thermal building envelope (respectively OI <sub>3</sub> 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 public 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.

## 5. Annex A: Detailed evaluation of criteria

# A Quality of location and facilities

## A2 Access to public transport network

This criterion is not evaluated through the checks the distance from public transportation access (station, bus stop ecc...). Max score has been given by the fact during the arrival and departure of the student, dedicated bus are available to bring them at the station and at the main bus stations.

<b>Access to public transport network</b>	max. 50
Points for each bus-station in a radius of 300 m with hourly frequency or shorter frequency	0
Points for each bus-station in a radius of 300 m with half-hourly frequency or shorter frequency	0
Points for each train-station in a radius of 500 m with hourly frequency or shorter frequency	0
Points for each train-station in a radius of 500 m with half-hourly frequency or shorter frequency	0

EB-points:	Max. points:	Obtained points
	50	50

## A2 Ecological quality of site

Quality of site and the related score is done considering one site typology, the s2.

- Therefore criteria a2 – area with zero ecological value

Performance score	Calculated Ecological value of land
-1 – negative	>5
0 – standard	5
3 – good	2,6
5 - excellent	1

EB-points:	Max. points:	Obtained points
	50	37,5

## B Process and planning quality

### B1 Decision making and determination of goals

A documentation of the decision making process exists partially. Different variants have been studied and evaluated in the planning phase. The 0-variant was evaluated and considered as not relevant.

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

EB-points:	Max. points:	Obtained points
	25	25

### B2 Formulation of verifiable objectives for energetic and ecological Measures

- Installation of solar thermal is considered for both water heating and support to heating of the building
- Efficiency of the ventilation system: the tenant and planner choose a product which with a high efficiency.
- The use of regional products is taken into account.

EB-points:	Max. points:	Obtained points
	25	25

### B3 Standardized calculation of the economic efficiency

The life cycle costs is not performed, but it has been considered the simplified method in which the evaluation is related to the consumption of the building respect the its variant (that has values of U according to the OIB6). In this case:

EB-points:	Max. points:	Obtained points
	40	40

### B4 Product-management-Use of low-emission products

Criteria	Max points	Obtained
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		points
Exists a documentation of the ecological optimization of the materials during the planning phases	10	0
The tender for all craftworks have been declared ecologically? Criteria like in section 03. 100% of works 90% of works 70% of works	20	0
Were all products of all craftworks declared? 100% 90% 70%	30 20 10	10
supervision exist? Did the supervisor do regularly inspections on the building site? - Total construction process - Partially construction process	20 10	10

EB-points:	Max. points:	Obtained points
	60	20

## B5 Planning support for energetic optimization

The energetically aspects during the planning and construction phase will be considered and optimized.

Criteria	Max points	Obtained points
Compilation of a space allocation plan	5	5
Roomly distribution of air-flows as calculated in PHPP	5	5
Establishment of internal heat gains	5	
Consideration of thermal bridges with 0,003 W(m <sup>2</sup> K)	5	
Description of energetically requirements (U <sub>w</sub> , U <sub>g</sub> , g-value, effectiveness heat recovery) in tendering	5	5
Control of energetically aspects in offers	5	5
Support of site manager in energetically aspects with meetings on building site	5	5
Protocol of the initial measurement of the ventilation system	5	5
Protocol of the blower door test	5	5
Protocol of hydraulically adjustment of heating system	5	5

Compilation of energy requirements calculation after the construction phase, blower door test	5	
Independent evaluation of the energy requirement calculation	5	5

EB-points:	Max. points:	Obtained points
	60	45

## B6 Information for users

A user manual will be provided to the user. Also when delivered an informative meeting will be held to inform the teachers and the student of shadings and window ventilation.

The enterprise takes care of the maintenance of the entire building equipment and appliances.

EB-points:	Max. points:	Obtained points
	25	25



## C Energy & Utilities (Passive house)

### C1 Specific heating demand (PHPP)

Specific space heat demand: 60kWh/m<sup>2</sup>a – respect to the limit of regional norm 11,5kWh/m<sup>3</sup>a

EB-points:	Max. points:	Obtained points
	100	23

### C2 Specific cooling demand (PHPP)

Specific cooling demand: 11 kWh/m<sup>2</sup>a

EB-points:	Max. points:	Obtained points
	100	10

### C3 Primary energy demand (PHPP)

Specific primary energy demand: 191 kWh/m<sup>2</sup>a

EB-points:	Max. points:	Obtained points
	125	0

### C4 CO<sub>2</sub>-emissions (PHPP)

CO<sub>2</sub>-emissions: 38,6 kg/m<sup>2</sup>a

EB-points:	Max. points:	Obtained points
	100	38,5

## D Health and Comfort

### D1 Thermal comfort in summer Criterion Points (max 150)

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

EB-points:	Max. points:	Obtained points
	150	45

### D2 Ventilation – non energetic aspects Criterion Points (max 50)

All the ventilation system has to be compliance with noise emission and all component used are certified. A measurement of the noise will be performed.

Criteria	Obtained points
Sound transmission calculation (depending on the room use), prognostic of expected sound pressure level $L_{A,nT} < 30 \text{ dB}$ and $L_{C(50-4000),nT} < 50 \text{ dB}$	25
Sound emission calculation on most exposed working place $L_{A,nT} < 30 \text{ dB}$ and $L_{C(50-4000),nT} < 50 \text{ dB}$	40
Sound emission calculation on most exposed working place $L_{A,nT} < 30 \text{ dB}$ und $L_{C(50-4000),nT} < 50 \text{ dB}$	50

EB-points:	Max. points:	Obtained points
	50	50

### D3 Daylight optimized (+ lightening optimized)

The daylight factor was calculated with following formula from UNI EN 15193, 2008 for each room:

EB-points:	Max. points:	Obtained points
	50	50

## E Building materials and construction

### E1 OI3<sub>TGH-ic</sub> ecological index of the thermal building envelope (respectively OI3 of the total mass of the building)

Tooling of calculation is the Ecosoft 4.0. The building is designed without considering the material with low ambient impact. The (OI3<sub>TGH-BGF</sub>) reach values of 153 also if no all structures have been considered this values can only increase. At the end the final values calculated with the formula:

$$2 * 0,0007 * OI3_{TGH-BGF}^2 - 0,623 * OI3_{TGH-BGF} + 123)$$

EB-points:	Max. points:	Obtained points
	200	85