

## Evaluation ENERBUILD-Tool – existing buildings

### 03 Medical Center Ried im Oberinntal



#### 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),<br>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 <sup>2</sup> (net)  | 498 m <sup>2</sup>   |
| Additional private uses                                | Residential use  |
| Effective area for private use in m <sup>2</sup> (net) | 238 m <sup>2</sup>   |
| Total effective area in m <sup>2</sup>                 | 736 m <sup>2</sup>   |
| 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 ENERBUILD 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

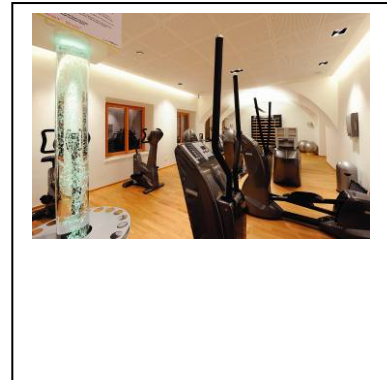
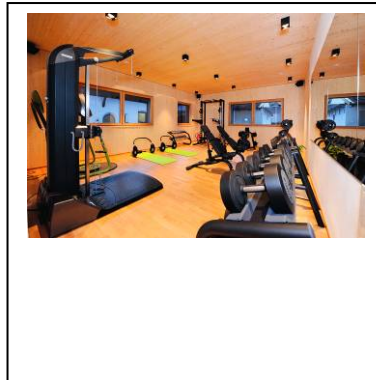
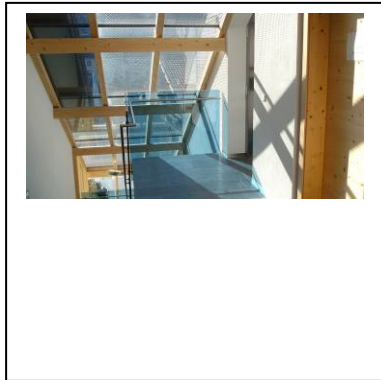
Temperature for thermal comfort in summertime:      26 °C

Local limits for heating demand:      50,00 kWh/m<sup>2</sup> (limit reconstruction)

40,85 kWh/m<sup>2</sup> (limit new building)

## 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>  |                  |
| A          | 1 | Access to public transport network   |                   | 50               | 6                |
| A          | 2 | Ecological quality of site   |                   | 50               | 50               |
| <b>B</b>   |   |  |                   |                  |                  |
|            |   | <b>Process and planning quality</b>  |                   | <b>max. 200</b>  |                  |
| 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               |
| <b>C</b>   |   |  |                   |                  |                  |
|            |   | <b>Energy &amp; Utilities (Passive house)</b>  |                   | <b>max. 350</b>  |                  |
| 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 | CO <sub>2</sub> -emissions (PHPP)  |                   | 50               | 0                |
| <b>D</b>   |   |  |                   |                  |                  |
|            |   | <b>Health and Comfort</b>  |                   | <b>max. 250</b>  |                  |
| D          | 1 | Thermal comfort in summer  |                   | 150              | 65               |
| D          | 2 | Ventilation - non energetic aspects  |                   | 50               | 25               |
| D          | 3 | Daylight optimized (+ lightening optimized)  |                   | 50               | 10               |
| <b>E</b>   |   |  |                   |                  |                  |
|            |   | <b>Building materials and construction</b>   |                   | <b>max. 200</b>  |                  |
| E          | 1 | OI <sub>3</sub> <sup>TGH-ic</sup> ecological index of the thermal building envelope (respectively OI <sub>3</sub> of the total mass of the building) |                   | 200              | 102              |
| <b>Sum</b> |   |  |                   | <b>max. 1000</b> | <b>525</b>       |



## 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 criterias for reconstructed buildings should be added.



## A 2 Ecological quality of site

The function of the site was not changed. The existing building was refurbished, the new part was attached behind.

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

| EB-Points | max. Points | obtained Points |
|-----------|-------------|-----------------|
|           | 50          | 50              |



## B Process and planning quality

### B 1 Decision making and determination of goals

An architectural competition was carried out and a documentation of the decision making process exists. Different variants have been studied and evaluated in the planning phase.

The 0-variant was evaluated and considered as not relevant.

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

| EB-Points | max. Points | Obtained Points |
|-----------|-------------|-----------------|
|           | 25          | 25              |

## B 2 Formulation of verifiable objectives for energetic and ecological measures

Definition of minimum criteria by fixing some limit values:

- The municipality fixed at the beginning of the planning process a limit for the energy consumption for heating. They defined a limit with 25 kWh/m<sup>2</sup>a as minimum standard for the new part and low energy standard < 50 kWh/m<sup>2</sup>a for the refurbishment.
- Then during the later planning phases the objective was changed to the Passive House limit with 15kWh/m<sup>2</sup>a for the new part and a refurbishment with passive house components for the old part of the building.
- When the decision was taken to plan a passive house, the heating system was changed from a pellet plant to a heat pump with use of the ground water.
- The air tightness was fixed within the passive house label: n<sub>50,lim</sub> < 0,6 h(-1).
- Efficiency of the ventilation system: the tenant and planner choose a product which was certified by the passive-house institute with a high efficiency.
- As the old part of the medical center is a class listed monument, only an internal insulation was possible.

|           |             |                        |
|-----------|-------------|------------------------|
| EB-Points | max. Points | <b>Obtained Points</b> |
|           | 25          | <b>15</b>              |

### B 3 Standardized calculation of the economic efficiency

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

|           |             |                        |
|-----------|-------------|------------------------|
| EB-Points | max. Points | <b>Obtained Points</b> |
|           | 40          | <b>0</b>               |



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

| Criteria   | Max. Points    | Obtained Points |
|--|----------------|-----------------|
| Exists a documentation of the ecological optimization of the materials during the planning phases?   | 10             | 5               |
| The tender for all craftworks have been declared ecologically?<br>100% of works<br>90% of works<br>70% of works  | 20<br>15<br>10 | 10              |
| Have all products of all craftworks been declared ecologically?<br>100% of works<br>90% of works<br>70% of works   | 30<br>20<br>10 | 10              |
| Does an ecological building supervision exist?<br>Did the supervisor do regularly inspections on the building site?<br>- Total construction process.<br>- Parts of the construction process. | 20<br>10       |                 |

| EB-Points | max. Points | Obtained Points |
|-----------|-------------|-----------------|
|           | 60          | 25              |

## B 5 Planning support for energetic optimization

The energetically aspects during the planning and construction phase were 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           | 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           | 5               |
| Independent evaluation of the energy requirement calculation  | 5           | 5               |

| EB-Points | max. Points | Obtained Points |
|-----------|-------------|-----------------|
|           | 60          | 55              |

## B 6 Information for users

A user manual does not exist for the building. However when the building was delivered an informative meeting was held to inform the forthcoming users about the use of shadings and window ventilation.

|           |             |                        |
|-----------|-------------|------------------------|
| EB-Points | max. Points | <b>Obtained Points</b> |
|           | 25          | <b>10</b>              |

## C Energy & Utilities

### C 1 Specific heating demand (PHPP)

Specific heat demand:

refurbishment: 23 kWh/m<sup>2</sup>a (56%), new building: 12 kWh/m<sup>2</sup>a (44%)

Averaged 18 kWh/m<sup>2</sup>a

| EB-Points | max. Points | obtained Points |
|-----------|-------------|-----------------|
|           | 100         | 82              |

### C 2 Specific cooling demand (PHPP)

Specific cooling demand: 5 kWh/m<sup>2</sup>a

| EB-Points | max. Points | obtained Points |
|-----------|-------------|-----------------|
|           | 100         | 55              |

### C 3 Primary energy demand (PHPP)

Specific primary energy demand: 177 kWh/m<sup>2</sup>a

| EB-Points | max. Points | obtained Points |
|-----------|-------------|-----------------|
|           | 125         | 0               |

### C 4 CO<sub>2</sub>-emissions (PHPP)

CO<sub>2</sub>-emissions: 62 kg/m<sup>2</sup>a

| EB-Points | max. Points | obtained Points |
|-----------|-------------|-----------------|
|           | 50          | 0               |

## D Health and Comfort

### D 1 Thermal comfort in summer

| Criteria  | Points                |
|---|-----------------------|
| Building with less than 35 % Windows surfaces and without active cooling system <ul style="list-style-type: none"> <li>- Analysis based on ON B8110-3</li> <li>- Or analysis OIB RL-6; <math>KB^* &lt; 0,4 \text{ kWh/m}^3\text{a}</math></li> <li>- Or analysis OIB RL-6; <math>KB^* &lt; 0,6 \text{ kWh/m}^3\text{a}</math></li> <li>- Or Analysis PHPP, Überschreitung <math>26 \text{ }^\circ\text{C} &lt; 5 \%</math></li> </ul>   | 50<br>50<br>35<br>65  |
| Dynamical building simulation (at least for critical rooms) considering the local climate, flexible shading systems and the respected usage of the buliding. <ul style="list-style-type: none"> <li>- exceeding <math>26 \text{ }^\circ\text{C} &lt; 5 \%</math> without activ coling system (e.b.free night cooling)</li> <li>- exceeding <math>26 \text{ }^\circ\text{C} &lt; 10 \%</math> without activ coling system (e.b.free night cooling)</li> <li>- exceeding <math>26 \text{ }^\circ\text{C} &lt; 3 \%</math> with active cooling system</li> <li>- Analysis to prevent air currents (<math>v &lt; 0,1 \text{ m/s}</math>, <math>\Delta T &lt; 2 \text{ K}</math> at the domicile)</li> </ul> | 150<br>50<br>75<br>75 |

Relation of opaque and transparent surfaces:  $1.502 \text{ m}^2$  of opaque surfaces and  $130 \text{ m}^2$  of transparent surfaces. 8,6 % of the surfaces are transparent, therefore the overheating analysis was made with the non dynamic calculation software PHPP.

The result of the overheating frequency is: 3 %

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

## D 2 Ventilation – non energetic aspects

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

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

### D 3 Daylight optimized (+ lightening optimized)

Result: Mean daylight factor: 2,3 %

| EB-Points | max. Points | obtained Points |
|-----------|-------------|-----------------|
|           | 50          | 10              |



## E Building materials and construction

### E 1 OI<sub>3TGH-Ic</sub> ecological index of the thermal building envelope (respectively OI<sub>3</sub> of the total mass of the building)

Die Punkte für die Bewertung im Programm ENERBUILD werden mit folgender Formel aus dem OI<sub>3TGH-BGF WG Ref.</sub>-Wert zwischen 38 und 295 berechnet:

$$\text{Punkte} = 2 * (0,0007 * \text{OI}_{3\text{TGH-BGF}_h}^2 - 0,623 * \text{OI}_{3\text{TGH-BGF}_h} + 123)$$

$$\text{Punkte} = 2 * (0,0007 * 136^2 - 0,623 * 136 + 123) = \mathbf{123 \text{ Punkte}}$$

OI<sub>3TGH-BGF WG Ref.</sub>-Werte ≤ 38 → 200 Punkte

OI<sub>3TGH-BGF WG Ref.</sub>-Werte ≥ 295 → 0 Punkte

| EB-Points | max. Points | obtained Points |
|-----------|-------------|-----------------|
|           | 200         | 102             |