

## WP6

# Analisi comparate del sistema di valutazione energetico-ambientale LEED Italia con altri sistemi di valutazione energetico-ambientale utilizzati in Europa

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# Scopo:

Proporre un sistema di valutazione per edifici pubblici ecosostenibili (“ecologici”) attraverso la verifica e l’implementazione locale del progetto NENA

|                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |          |      |            |
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| WP 6                                           | Efficiency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |    |          |      |            |
| TIMEFRAME:                                     | Starting date of implementation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 01 | 10       | 2009 |            |
|                                                | Closure date of implementation:                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 30 | 06       | 2012 |            |
| WP BUDGET:                                     | Total project costs:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |          |      | 387.301,00 |
|                                                | ERDF:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |    |          |      | 275.348,76 |
| WP RESPONSIBLE:                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EU | LP: VLBG |      |            |
| CONTRIBUTION TO THE PROJECT'S MAIN OBJECTIVES: | There haven't been worked out any general valid evaluation methods for ecological public buildings until now. Within the framework of the project NENA an evaluation scheme was drafted. The aim of WP6 is to evaluate this model in different areas and to implement them locally by establishing certification bodies and authorising key persons. This structures empowers public decision makers to design decision processes for establishing ecological public ESAP buildings in the Alpine Space. |    |          |      |            |
| LINKAGE TO OTHER WP:                           | The research results of WP6 will be used in WP4 for awareness raising and training modules. In addition to this in WP8 to stimulate innovation and implementation of concrete building projects.                                                                                                                                                                                                                                                                                                         |    |          |      |            |

# Articolazione:

- Action 6.1: analisi comparati di strumenti per la valutazione di ecosostenibilità di edifici pubblici
- Action 6.2: sviluppo di uno strumento per la costruzione di edifici ecologici ed energeticamente efficienti
- Action 6.3: valutazione dello strumento su edifici campione – pubblici o a uso pubblico e costruiti da meno di 5 anni

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| ACTIONS WITHIN THIS WP: | Action 6.1:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Transnational comparison of instruments according to ecological evaluation of public buildings             |
|                         | Action 6.2:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Improvement and promotion of instruments for the construction of ecological and energy efficient buildings |
|                         | Action 6.3:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Pilot testing of instruments and methods, e.g. evaluation of selected (public) buildings                   |
|                         | Action 6.4:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Establish an Advisory Service for certifying ecological public building                                    |
|                         | Action 6.5:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | WPR - CEA Common Enerbuild activities                                                                      |
| EXPECTED OUTPUTS:       | <p>6.1 In the first step the "efficiency team" (5PPs) evaluates the different instruments for the ecological evaluation of buildings and compares these instruments. 6.2 The team (5PPs) evaluates 30 max. 5 year old energy efficient public buildings. 6.3 8 PP's establish local expert groups which are entitled to use the model on local level and to certify the construction process.</p> <p>6.4 The evaluation instrument allows local decision makers to evaluate public buildings within the entire establishing process (competition, design, planning, building and usage) under ecological criteria. Within this pilot activity 48 buildings are evaluated and 5 PP areas have adequate structures with authorisation services for the certification at their disposal.</p> |                                                                                                            |

## Action 6.1      analisi comparati di strumenti per la valutazione di ecosostenibilità di edifici pubblici

Protocolli considerati nello studio:

- Protocollo ITACA - Regione Piemonte - Italy
- LEED Italia (Leadership in Energy and Environmental Design) - Italy
- Casaclima Nature - Italy
- DGNB (German Green Building Council) – Germany
- Démarche BDM (Bâtiments Durables Méditerranéens) – France
- HQE (Haute Qualité Environnementale) – France
- Total Quality Building – Austria
- Minergie Eco / P- Eco - Switzerland

## Action 6.1 analisi comparati di strumenti per la valutazione di ecosostenibilità di edifici pubblici

Comparazione dei protocolli di certificazione con riferimento agli **utilizzatori**

| USERS                     | P. Itaca<br>R.P. | LEED<br>Italia | Casaclima<br>Nature | DGNB | Total<br>Quality | BDM | HQE | Minergie<br>ECO |
|---------------------------|------------------|----------------|---------------------|------|------------------|-----|-----|-----------------|
| Designers                 |                  |                |                     |      |                  |     |     |                 |
| Consultants               |                  |                |                     |      |                  |     |     |                 |
| Construction<br>companies |                  |                |                     |      |                  |     |     |                 |
| Investors                 |                  |                |                     |      |                  |     |     |                 |
| Public<br>institutions    |                  |                |                     |      |                  |     |     |                 |
| Consumers /<br>end-users  |                  |                |                     |      |                  |     |     |                 |
| Researchers               |                  |                |                     |      |                  |     |     |                 |
| Other                     |                  |                |                     |      |                  |     |     |                 |

Fonte: ENERBUILD Final Result 6.1 Transnational comparison of instruments (Arch. Andrea MORO, 2011)

## Action 6.1      analisi comparati di strumenti per la valutazione di ecosostenibilità di edifici pubblici

Comparazione dei protocolli di certificazione con riferimento ai **confini fisici**

| Physical Boundaries | P. Itaca R.P. | LEED Italia | Casaclima Nature | DGNB | Total Quality | BDM | HQE | Minergie ECO |
|---------------------|---------------|-------------|------------------|------|---------------|-----|-----|--------------|
| Building            |               |             |                  |      |               |     |     |              |
| Site                |               |             |                  |      |               |     |     |              |
| Neighbourhood       |               |             |                  |      |               |     |     |              |

Fonte: ENERBUILD Final Result 6.1 Transnational comparison of instruments (Arch. Andrea MORO, 2011)

## Action 6.1 analisi comparati di strumenti per la valutazione di ecosostenibilità di edifici pubblici

Comparazione dei protocolli di certificazione con riferimento alle **fasi**

| Time Boundaries  | P. Itaca R.P. | LEED Italia | Casaclima Nature | DGNB | Total Quality | BDM | HQE | Minergie ECO |
|------------------|---------------|-------------|------------------|------|---------------|-----|-----|--------------|
| Pre Design       |               |             |                  |      |               |     |     |              |
| Design           |               |             |                  |      |               |     |     |              |
| As Built         |               |             |                  |      |               |     |     |              |
| Operation        |               |             |                  |      |               |     |     |              |
| Returbishment    |               |             |                  |      |               |     |     |              |
| In use buildings |               |             |                  |      |               |     |     |              |

Fonte: ENERBUILD Final Result 6.1 Transnational comparison of instruments (Arch. Andrea MORO, 2011)

## Action 6.1 analisi comparati di strumenti per la valutazione di ecosostenibilità di edifici pubblici

Comparazione dei protocolli di certificazione con riferimento alle **tipologie edilizie**

| Building Uses          | P. Itaca R.P. | LEED Italia | Casaclima | DGNB | TQ | BDM | HQE | Minergie ECO |
|------------------------|---------------|-------------|-----------|------|----|-----|-----|--------------|
| Residential/d wellings |               |             |           |      |    |     |     |              |
| Offices                |               |             |           |      |    |     |     |              |
| Schools                |               |             |           |      |    |     |     |              |
| Retail                 |               |             |           |      |    |     |     |              |
| Industrial             |               |             |           |      |    |     |     |              |
| Healthcare             |               |             |           |      |    |     |     |              |
| Hotel                  |               |             |           |      |    |     |     |              |

Fonte: ENERBUILD Final Result 6.1 Transnational comparison of instruments (Arch. Andrea MORO, 2011)

## Action 6.1 analisi comparati di strumenti per la valutazione di ecosostenibilità di edifici pubblici

### Top 10 dei *criteri chiave* nei protocolli di certificazione europei (ordinati per peso)

| Legenda | Top 10 | P. Itaca                      | LEED Italia                  | Casaclima Nature                                 | DGNB                                                                        | Total Quality                                    | BDM                                               | HQE                                         | Minergie ECO |           |     |  |
|---------|--------|-------------------------------|------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------|---------------------------------------------|--------------|-----------|-----|--|
|         |        | Technical documentation       | Optimize nergy performance   | Energy consumption for heating                   | Global Warming Potential (GWP)                                              | Primary energy demand                            | Thermal mass                                      | Primary energy deamand                      | N.A.         | energy    | 37% |  |
|         |        | U value                       | On site renewable energy     | CO2 emissions                                    | Building-related Life Cycle Costs                                           | CO2-emissions from energy consumption            | Healthy materials                                 | Healthy materials                           |              | materials | 20% |  |
|         |        | Net Energy heating            | Alternative transportation   | Primary energy (product manufacturing)           | Thermal Comfort in the Summer                                               | Q13-calculation as guideline                     | Local materials                                   | Exploitation of construction activity waste |              | water     | 9%  |  |
|         |        | Primary energy heating        | Development density          | Acidification (product manufacturing)            | Indoor Hygiene                                                              | Disposal indicators                              | Recycled materials                                | Water consumptions for indoor uses          |              | site      | 9%  |  |
|         |        | Solar radiation control       | Water efficient landscaping  | Global warming potential (product manufacturing) | Visual Comfort                                                              | Economic efficiency calculation-LCCA             | Renewable energy                                  | Building adaptability                       |              | comfort   | 6%  |  |
|         |        | Thermal mass                  | Water use rduction           |                                                  | Quality of the Project's Preparation                                        | Energy demand for heating HWB                    | Public transports                                 | Daylight                                    |              | process   | 6%  |  |
|         |        | Sanitary Hot Water            | Building Reuse               |                                                  | Integral Planning                                                           | Avoidance of PVC                                 | Proximity to services                             | Water retention on site                     |              | service   | 5%  |  |
|         |        | Potable water for indoor uses | Measurement and verification |                                                  | Optimization and Complexity of the Approach to Planning                     | Low-emission constructing and building materials | Construction site wastes                          | Construction materials reuse                |              | waste     | 5%  |  |
|         |        | P.V. Energy                   | 4 criteria on materials      |                                                  | Quality assurance of the construction activities + Systematic commissioning | Barrier free built                               | Water consumptions minimisation                   | Energy consumptions monitoring              |              | economy   | 3%  |  |
|         |        | CO2 Emissions                 | 3 criteria on energy         |                                                  | Connection to transportation                                                | Thermal comfort in summer                        | Solar radiation control + consumptions monitoring | Transport optimisation                      |              |           |     |  |
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## Action 6.2

sviluppo di uno strumento per la costruzione di edifici ecologici ed energeticamente efficienti

### ENERBUILD Tool

| Nr. |   | Title                                                                                                                                  | Must criterias (M); Minimum standard | max. Points | A                                                                                                                                | Quality of location and facilities  | max. 100 |
|-----|---|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------|
| A   |   | Quality of location and facilities                                                                                                     |                                      | max. 100    | B                                                                                                                                | Process and planning quality        | max. 200 |
| A   | 1 | Access to public transport network                                                                                                     |                                      | 50          |                                                                                                                                  |                                     |          |
| A   | 2 | Ecological quality of site                                                                                                             |                                      | 50          |                                                                                                                                  |                                     |          |
| B   |   | Process and planning quality                                                                                                           |                                      | max. 200    | C                                                                                                                                | Energy & Utilities                  | max. 350 |
| B   | 1 | Decision making and determination of goals                                                                                             |                                      | 25          |                                                                                                                                  |                                     |          |
| B   | 2 | Formulation of verifiable objectives for energetic and ecological measures                                                             | M                                    | 20          |                                                                                                                                  |                                     |          |
| B   | 3 | Standardized calculation of the economic efficiency                                                                                    | M                                    | 40          | D                                                                                                                                | Health and Comfort                  | max. 250 |
| B   | 4 | Product-management - Use of low-emission products                                                                                      |                                      | 60          |                                                                                                                                  |                                     |          |
| B   | 5 | Planning support ofr energetic optimization                                                                                            |                                      | 60          |                                                                                                                                  |                                     |          |
| B   | 6 | Information of users                                                                                                                   |                                      | 25          | E                                                                                                                                | Building materials and construction | max. 200 |
| C   |   | Energy & Utilities                                                                                                                     |                                      | max. 350    |                                                                                                                                  |                                     |          |
| C   | 1 | Specific heating demand (PHPP)                                                                                                         | M                                    | 100         |                                                                                                                                  |                                     |          |
| C   | 2 | Specific cooling demand (PHPP)                                                                                                         | M                                    | 100         | Fonte: ENERBUILD Final Result 6.2-4 ENERBUILD Tool: Transnational Pilot Testing on 45 Buildings (DI Mag. Markus BERCHTOLD, 2012) |                                     |          |
| C   | 3 | Primary energy demand (PHPP)                                                                                                           | M                                    | 125         |                                                                                                                                  |                                     |          |
| C   | 4 | CO <sub>2</sub> -emissions (PHPP)                                                                                                      |                                      | 50          |                                                                                                                                  |                                     |          |
| D   |   | Health and Comfort                                                                                                                     |                                      | max. 250    |                                                                                                                                  |                                     |          |
| D   | 1 | Thermal comfort in summer                                                                                                              |                                      | 150         |                                                                                                                                  |                                     |          |
| D   | 2 | Ventilation - non energetic aspects                                                                                                    |                                      | 50          |                                                                                                                                  |                                     |          |
| D   | 3 | Daylight optimized (+ lightening optimized)                                                                                            |                                      | 50          |                                                                                                                                  |                                     |          |
| E   |   | Building materials and construction                                                                                                    |                                      | max. 200    |                                                                                                                                  |                                     |          |
| E   | 1 | OI <sub>3</sub> <sub>TGHc</sub> ecological index of the thermal building envelope (respectively OI3 of the total mass of the building) |                                      | 200         |                                                                                                                                  |                                     |          |
| Sum |   |                                                                                                                                        |                                      | max. 1.000  |                                                                                                                                  |                                     |          |

Fonte: ENERBUILD Final Result 6.2-4 ENERBUILD Tool: Transnational Pilot Testing on 45 Buildings (DI Mag. Markus BERCHTOLD, 2012)

## Action 6.2

sviluppo di uno strumento per la costruzione di edifici ecologici ed energeticamente efficienti

### ENERBUILD Tool

#### Users

|                         |  |
|-------------------------|--|
| Designers               |  |
| Consultants             |  |
| Construction companies  |  |
| Investors               |  |
| Public institutions     |  |
| Consumers / end -users  |  |
| Researchers             |  |
| Others (please specify) |  |

#### Time boundaries

|                    |  |
|--------------------|--|
| Pre Design         |  |
| Design             |  |
| Construction       |  |
| Operation          |  |
| Refurbishment      |  |
| Existing buildings |  |

#### Time and physical extends

##### Physical boundaries

|               |  |
|---------------|--|
| Building      |  |
| Site          |  |
| Neighbourhood |  |

#### Building uses

|                        |  |
|------------------------|--|
| Residential/dwellings  |  |
| Offices                |  |
| Schools                |  |
| Retail                 |  |
| Industrial             |  |
| Healthcare             |  |
| Hotel                  |  |
| Other (please specify) |  |

#### Structure of the assessment system

##### Building use: all

|                                     |     |
|-------------------------------------|-----|
| Number of hierarchic levels         | 2   |
| Number of issues at top level       | 5   |
| Number of issues at middle level    | 0   |
| Number of criteria (low level)      | 16  |
| Number of environmental criteria    | 11  |
| Number of social criteria           | 4   |
| Number of economic criteria         | 1   |
| Percentage of quantitative criteria | 69% |
| Number of mandatory criteria        | 5   |

Fonte: ENERBUILD Final Result 6.2-4 ENERBUILD Tool: Transnational Pilot Testing on 45 Buildings (DI Mag. Markus BERCHTOLD, 2012)

## Action 6.2

sviluppo di uno strumento per la costruzione di edifici ecologici ed energeticamente efficienti

### ENERBUILD Tool

Criteria by issues (Environmental, Social, Economic)

| Nr.      | Title                                                                                                                       |  | Environmental | Social | Economic |
|----------|-----------------------------------------------------------------------------------------------------------------------------|--|---------------|--------|----------|
| <b>A</b> | <b>Quality of location and facilities</b>                                                                                   |  |               |        |          |
| A 1      | Access to public transport network                                                                                          |  |               |        |          |
| A 2      | Ecological quality of site                                                                                                  |  |               |        |          |
| <b>B</b> | <b>Process and planning quality</b>                                                                                         |  |               |        |          |
| B 1      | Decision making and determination of goals                                                                                  |  |               |        |          |
| B 2      | Formulation of verifiable objectives for energetic and ecological measures                                                  |  |               |        |          |
| B 3      | Standardized calculation of the economic efficiency                                                                         |  |               |        |          |
| B 4      | Product-management - Use of low-emission products                                                                           |  |               |        |          |
| B 5      | Planning support ofr energetic optimization                                                                                 |  |               |        |          |
| B 6      | Information of users                                                                                                        |  |               |        |          |
| <b>C</b> | <b>Energy &amp; Utilities</b>                                                                                               |  |               |        |          |
| C 1      | Specific heating demand (PHPP)                                                                                              |  |               |        |          |
| C 2      | Specific cooling demand (PHPP)                                                                                              |  |               |        |          |
| C 3      | Primary energy demand (PHPP)                                                                                                |  |               |        |          |
| C 4      | CO2-emissions (PHPP)                                                                                                        |  |               |        |          |
| <b>D</b> | <b>Health and Comfort</b>                                                                                                   |  |               |        |          |
| D 1      | Thermal comfort in summer                                                                                                   |  |               |        |          |
| D 2      | Ventilation - non energetic aspects                                                                                         |  |               |        |          |
| D 3      | Daylight optimized (+ lightening optimized)                                                                                 |  |               |        |          |
| <b>E</b> | <b>Building materials and construction</b>                                                                                  |  |               |        |          |
| E 1      | OI3 <sub>TGHic</sub> ecological index of the thermal building envelope (respectively OI3 of the total mass of the building) |  |               |        |          |

Fonte: ENERBUILD Final Result 6.2-4 ENERBUILD Tool: Transnational Pilot Testing on 45 Buildings (DI Mag. Markus BERCHTOLD, 2012)

## Action 6.2

sviluppo di uno strumento per la costruzione di edifici ecologici ed energeticamente efficienti

### ENERBUILD Tool

#### Criteria by weight

| 200 |   |                                                                                                                  |   |
|-----|---|------------------------------------------------------------------------------------------------------------------|---|
| E   | 1 | OI3TGH-Ic ecological index of the thermal building envelope (respectively OI3 of the total mass of the building) |   |
| 150 |   |                                                                                                                  |   |
| D   | 1 | Thermal comfort in summer                                                                                        |   |
| 125 |   |                                                                                                                  |   |
| C   | 3 | Primary energy demand (PHPP)                                                                                     | M |
| 100 |   |                                                                                                                  |   |
| C   | 1 | Specific heating demand (PHPP)                                                                                   | M |
| C   | 2 | Specific cooling demand (PHPP)                                                                                   | M |
| 60  |   |                                                                                                                  |   |
| B   | 4 | Product-management - Use of low-emission products                                                                |   |
| B   | 5 | Planning support for energetic optimization                                                                      |   |
| 50  |   |                                                                                                                  |   |
| A   | 1 | Access to public transport network                                                                               |   |
| A   | 2 | Ecological quality of site                                                                                       |   |
| C   | 4 | CO2-emissions (PHPP)                                                                                             |   |
| D   | 2 | Ventilation - non energetic aspects                                                                              |   |
| D   | 3 | Daylight optimized (+ lightening optimized)                                                                      |   |
| 40  |   |                                                                                                                  |   |
| R   | 3 | Standardized calculation of the economic efficiency                                                              | M |
| 25  |   |                                                                                                                  |   |
| B   | 1 | Decision making and determination of goals                                                                       |   |
| B   | 6 | Information for users                                                                                            |   |
| 20  |   |                                                                                                                  |   |
| B   | 2 | Formulation of verifiable objectives for energetic and ecological measures                                       | M |

Fonte: ENERBUILD Final Result 6.2-4 ENERBUILD Tool: Transnational Pilot Testing on 45 Buildings (DI Mag. Markus BERCHTOLD, 2012)

## Action 6.3 valutazione dello strumento su edifici campione – pubblici o a uso pubblico e costruiti da meno di 5 anni

### ENERBUILD Tool

| Summary of Evaluations |   |                                                                                                                            |                                           |                |                     |           |
|------------------------|---|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------|---------------------|-----------|
| Nr.                    |   | Title                                                                                                                      | Must<br>criteria<br>(M); min.<br>standard | max.<br>Points | evaluated<br>Points | % of max. |
| A                      |   | Quality of location and facilities                                                                                         |                                           | max. 100       | 70                  | 70%       |
| A                      | 1 | Access to public transport network                                                                                         |                                           | 50             | 25                  | 50%       |
| A                      | 2 | Ecological quality of site                                                                                                 |                                           | 50             | 45                  | 89%       |
| D                      |   | Process and planning quality                                                                                               |                                           | max. 200       | 154                 | 77%       |
| B                      | 1 | Decision making and determination of goals                                                                                 |                                           | 25             | 22                  | 86%       |
| B                      | 2 | Formulation of verifiable objectives for energetic and ecological measures                                                 | M                                         | 20             | 18                  | 89%       |
| B                      | 3 | Standardized calculation of the economic efficiency                                                                        | M                                         | 40             | 16                  | 41%       |
| B                      | 4 | Product-management - Use of low-emission products                                                                          |                                           | 60             | 38                  | 64%       |
| B                      | 5 | Planning support ofr energetic optimization                                                                                |                                           | 60             | 45                  | 75%       |
| B                      | 6 | Information of users                                                                                                       |                                           | 25             | 23                  | 91%       |
| C                      |   | Energy & Utilities                                                                                                         |                                           | max. 350       | 249                 | 71%       |
| C                      | 1 | Specific heating demand (PHPP)                                                                                             | M                                         | 100            | 65                  | 65%       |
| C                      | 2 | Specific cooling demand (PHPP)                                                                                             | M                                         | 100            | 64                  | 64%       |
| C                      | 3 | Primary energy demand (PHPP)                                                                                               | M                                         | 125            | 86                  | 69%       |
| C                      | 4 | CO <sub>2</sub> -emissions (PHPP)                                                                                          |                                           | 20             | 36                  | 72%       |
| D                      |   | Health and Comfort                                                                                                         |                                           | max. 250       | 122                 | 49%       |
| D                      | 1 | Thermal comfort in summer                                                                                                  |                                           | 150            | 69                  | 46%       |
| D                      | 2 | Ventilation - non energetic aspects                                                                                        |                                           | 50             | 25                  | 50%       |
| D                      | 3 | Daylight optimized (+ lightening optimized)                                                                                |                                           | 50             | 28                  | 57%       |
| E                      |   | Building materials and construction                                                                                        |                                           | max. 200       | 130                 | 65%       |
| E                      | 1 | O13 <sub>TGHk</sub> ecological index of the thermal building envelope (respectively O12 of the total mass of the building) |                                           | 200            | 130                 | 65%       |
| Sum                    |   |                                                                                                                            |                                           | max. 1.000     | 725                 | 73%       |

Punteggio minimo: 525

Punteggio massimo: 999

Sui singoli criteri, la media è compresa fra 41 e 91% del valore massimo ottenibile

## Action 6.3 valutazione dello strumento su edifici campione – pubblici o a uso pubblico e costruiti da meno di 5 anni

### Pilot Buildings in Provincia di Trento

- |    |                                        |           |
|----|----------------------------------------|-----------|
| 1. | ITC Floriani – Riva del Garda          | punti 652 |
| 2. | Residenza universitaria Mayer – Trento | punti 685 |
| 3. | Nuovo polo scolastico di Mezzolombardo | punti 607 |
| 4. | Scuola di Romarzollo – Arco            | punti 561 |
| 5. | Municipio di Vigo Rendena              | punti 675 |
| 6. | Canonica di Vigo Rendena               | punti 595 |

# Action 6.3 valutazione dello strumento su edifici campione – pubblici o a uso pubblico e costruiti da meno di 5 anni

## ENERBUILD Tool

| Nr. | Title                                                                            | Must criteria | max. Points | Vorarlberg - Austria<br>Blizau | Vorarlberg - Austria<br>St. Gerold | Vorarlberg - Austria<br>Thüringerberg | Vorarlberg - Austria<br>Rankweil | RAEE - Francia<br>Combe | RAEE - Francia<br>Bassens | RAEE - Francia<br>Chambéry le-Haut | RAEE - Francia<br>Les Jardins d'Eden | RAEE - Francia<br>Opération Busson | RAEE - Francia<br>La Terrasse | RAEE - Francia<br>Maison Vercors | RAEE - Francia<br>Papillons | Regione Piemonte - Italy<br>Mazzé | Regione Piemonte - Italy<br>PUCEL | Regione Piemonte - Italy<br>Torre Balfred | Regione Piemonte - Italy<br>Passiv house Cierie | Regione Piemonte - Italy<br>Mondovì | Regione Piemonte - Italy<br>Weiskirchen | Regione Piemonte - Italy<br>Eppenstein |
|-----|----------------------------------------------------------------------------------|---------------|-------------|--------------------------------|------------------------------------|---------------------------------------|----------------------------------|-------------------------|---------------------------|------------------------------------|--------------------------------------|------------------------------------|-------------------------------|----------------------------------|-----------------------------|-----------------------------------|-----------------------------------|-------------------------------------------|-------------------------------------------------|-------------------------------------|-----------------------------------------|----------------------------------------|
| A   | Quality of location and facilities                                               |               | max. 100    | 50                             | 47                                 | 60                                    | 84                               | 25                      | 76                        | 68                                 | 100                                  | 58                                 | 86                            | 80                               | 96                          | 48                                | 48                                | 48                                        | 50                                              | 70                                  | 86                                      | 62                                     |
| A 1 | Access to public transport network                                               |               | 50          | 20                             | 12                                 | 12                                    | 48                               | 0                       | 26                        | 18                                 | 50                                   | 20                                 | 36                            | 30                               | 46                          | 10                                | 10                                | 10                                        | 0                                               | 20                                  | 36                                      | 12                                     |
| A 2 | Ecological quality of site                                                       |               | 50          | 30                             | 35                                 | 48                                    | 36                               | 25                      | 50                        | 50                                 | 50                                   | 38                                 | 50                            | 50                               | 50                          | 38                                | 38                                | 38                                        | 50                                              | 50                                  | 50                                      | 50                                     |
| B   | Process and planning quality                                                     |               | max. 200    | 200                            | 200                                | 180                                   | 155                              | 135                     | 60                        | 145                                | 110                                  | 150                                | 200                           | 174                              | 90                          | 190                               | 180                               | 150                                       | 189                                             | 190                                 | 180                                     | 168                                    |
| B 1 | Decision making and determination of goals                                       |               | 25          | 15                             | 25                                 | 15                                    | 0                                | 25                      | 10                        | 25                                 | 25                                   | 25                                 | 25                            | 24                               | 25                          | 25                                | 15                                | 25                                        | 24                                              | 25                                  | 25                                      | 23                                     |
| B 2 | Verifiable objectives for energetic and ecological measures                      | M             | 20          | 20                             | 20                                 | 20                                    | 20                               | 20                      | 0                         | 0                                  | 20                                   | 25                                 | 20                            | 0                                | 20                          | 20                                | 20                                | 20                                        | 20                                              | 20                                  | 20                                      | 20                                     |
| B 3 | Standardized calculation of the economic efficiency                              | M             | 40          | 35                             | 35                                 | 30                                    | 30                               | 0                       | 0                         | 0                                  | 40                                   | 40                                 | 40                            | 0                                | 20                          | 20                                | 20                                | 40                                        | 20                                              | 0                                   | 0                                       |                                        |
| B 4 | Product-management - low-emission products                                       |               | 60          | 60                             | 60                                 | 60                                    | 60                               | 10                      | 60                        | 0                                  | 10                                   | 60                                 | 60                            | 10                               | 40                          | 40                                | 30                                | 20                                        | 40                                              | 50                                  | 60                                      |                                        |
| B 5 | Planning support ofr energetic optimization                                      |               | 60          | 60                             | 60                                 | 30                                    | 20                               | 30                      | 20                        | 60                                 | 60                                   | 30                                 | 60                            | 30                               | 30                          | 60                                | 60                                | 30                                        | 60                                              | 60                                  | 40                                      |                                        |
| B 6 | Information of users                                                             |               | 25          | 25                             | 25                                 | 25                                    | 25                               | 0                       | 0                         | 0                                  | 25                                   | 25                                 | 25                            | 0                                | 25                          | 25                                | 25                                | 25                                        | 25                                              | 25                                  | 25                                      |                                        |
| C   | Energy & Utilities                                                               |               | max. 350    | 264                            | 350                                | 324                                   | 191                              | 350                     | 321                       | 128                                | 243                                  | 327                                | 219                           | 350                              | 350                         | 94                                | 213                               | 162                                       | 350                                             | 185                                 | 316                                     | 193                                    |
| C 1 | Specific heating demand (PHPP)                                                   | M             | 100         | 84                             | 100                                | 100                                   | 40                               | 100                     | 46                        | 0                                  | 76                                   | 52                                 | 92,5                          | 100                              | 100                         | 30                                | 88                                | 22                                        | 100                                             | 10                                  | 100                                     | 10                                     |
| C 2 | Specific cooling demand (PHPP)                                                   | M             | 100         | 50                             | 100                                | 49                                    | 73                               | 100                     | 100                       | 100                                | 100                                  | 100                                | 100                           | 100                              | 100                         | 0                                 | 0                                 | 0                                         | 91                                              | 0                                   | 64                                      | 37                                     |
| C 3 | Primary energy demand (PHPP)                                                     | M             | 125         | 100                            | 125                                | 125                                   | 68                               | 125                     | 125                       | 0                                  | 24                                   | 125                                | 16,5                          | 125                              | 125                         | 64                                | 125                               | 90                                        | 125                                             | 125                                 | 125                                     | 101                                    |
| C 4 | CO <sub>2</sub> -emissions (PHPP)                                                |               | 20          | 30                             | 50                                 | 50                                    | 10                               | 50                      | 50                        | 28                                 | 43                                   | 50                                 | 10                            | 50                               | 50                          | 0                                 | 0                                 | 50                                        | 50                                              | 50                                  | 27                                      | 45                                     |
| D   | Health and Comfort                                                               |               | max. 250    | 174                            | 194                                | 184                                   | 148                              | 115                     | 175                       | 140                                | 162                                  | 140                                | 200                           | 177                              | 139                         | 180                               | 180                               | 150                                       | 140                                             | 150                                 | 164                                     | 181                                    |
| D 1 | Thermal comfort in summer                                                        |               | 150         | 0                              | 65                                 | 65                                    | 65                               | 150                     | 0                         | 150                                | 0                                    | 150                                | 0                             | 150                              | 150                         | 75                                | 75                                | 50                                        | 50                                              | 75                                  | 150                                     | 150                                    |
| D 2 | Ventilation - non energetic aspects                                              |               | 50          | 50                             | 40                                 | 40                                    | 40                               | 0                       | 0                         | 50                                 | 0                                    | 0                                  | 0                             | 0                                | 25                          | 30                                | 25                                | 25                                        | 25                                              | 50                                  | 50                                      |                                        |
| D 3 | Daylight optimized                                                               |               | 50          | 10                             | 50                                 | 0                                     | 10                               | 0                       | 0                         | 0                                  | 0                                    | 0                                  | 50                            | 50                               | 0                           | 30                                | 25                                | 10                                        | 10                                              | 50                                  | 35                                      |                                        |
| E   | Building materials and construction                                              |               | max. 200    | 174                            | 194                                | 184                                   | 148                              | 115                     | 175                       | 140                                | 162                                  | 140                                | 200                           | 177                              | 139                         | 180                               | 180                               | 150                                       | 140                                             | 150                                 | 164                                     | 181                                    |
| E 1 | OI <sub>3</sub> <sub>TEK</sub> ecological index of the thermal building envelope |               | 200         | 174                            | 194                                | 184                                   | 148                              | 115                     | 175                       | 140                                | 162                                  | 140                                | 200                           | 177                              | 139                         | 180                               | 180                               | 150                                       | 140                                             | 150                                 | 164                                     | 181                                    |
| Sum |                                                                                  |               | max. 1.000  | 748                            | 946                                | 853                                   | 693                              | 775                     | 632                       | 681                                | 615                                  | 825                                | 755                           | 981                              | 850                         | 647                               | 746                               | 595                                       | 814                                             | 745                                 | 996                                     | 839                                    |

|                                                   |     |     |     |     |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |     |     |     |     |     |     |     |
|---------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|
| EA0 Styria - Austria<br>Scheffing                 | 100 | 50  | 100 | 50  | 56  | 62  | 62  | 88  | 60  | 92  | 100 | 50  | 50  | 37,5 | 87,5 | 87,5 | 87,5 | 87,5 | 57,5 | 56  | 82  | 56  | 56  | 62  | 76  | 100 |
| EA0 Styria - Austria<br>ITZ Zeltweg               | 50  | 0   | 50  | 0   | 6   | 12  | 12  | 50  | 18  | 50  | 50  | 0   | 0   | 50   | 50   | 50   | 50   | 50   | 20   | 6   | 32  | 6   | 6   | 12  | 36  | 50  |
| EA0 Styria - Austria<br>Neumarkt                  | 50  | 50  | 50  | 50  | 50  | 50  | 50  | 38  | 42  | 42  | 50  | 50  | 50  | 37,5 | 37,5 | 37,5 | 37,5 | 37,5 | 50   | 50  | 50  | 50  | 50  | 40  | 50  |     |
| TZS Tyrol - Austria<br>Zams                       | 160 | 160 | 160 | 133 | 130 | 160 | 130 | 170 | 140 | 195 | 180 | 135 | 170 | 80   | 170  | 180  | 104  | 115  | 185  | 130 | 130 | 140 | 165 | 106 | 163 | 200 |
| TZS Tyrol - Austria<br>Medical Centre Ried        | 25  | 25  | 25  | 18  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 25  | 15   | 25   | 25   | 14   | 25   | 25   | 15  | 5   | 15  | 20  | 16  | 25  | 25  |
| TZS Tyrol - Austria<br>Landeck                    | 20  | 20  | 20  | 10  | 15  | 15  | 10  | 20  | 20  | 20  | 20  | 20  | 20  | 0    | 20   | 25   | 20   | 20   | 20   | 20  | 20  | 20  | 20  | 18  | 20  |     |
| TZS Tyrol - Austria<br>Kramsach                   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 40  | 0   | 40  | 40  | 40  | 40  | 0    | 40   | 40   | 0    | 0    | 40   | 0   | 0   | 0   | 0   | 0   | 40  |     |
| Prov. of Trent - Italy<br>Romazollo               | 40  | 50  | 30  | 40  | 25  | 45  | 25  | 50  | 50  | 50  | 50  | 50  | 50  | 20   | 20   | 20   | 20   | 20   | 20   | 30  | 30  | 30  | 55  | 0   | 50  | 55  |
| Prov. of Trent - Italy<br>Floriani                | 50  | 40  | 60  | 50  | 55  | 60  | 55  | 35  | 45  | 35  | 45  | 0   | 35  | 20   | 40   | 45   | 25   | 25   | 55   | 55  | 60  | 60  | 55  | 50  | 55  | 55  |
| Prov. of Trent - Italy<br>Mezzolombardo           | 25  | 25  | 25  | 15  | 10  | 15  | 15  | 0   | 0   | 25  | 0   | 0   | 0   | 25   | 25   | 25   | 25   | 25   | 25   | 10  | 15  | 15  | 15  | 20  | 15  | 25  |
| Prov. of Trent - Italy<br>Mayer                   | 209 | 50  | 314 | 194 | 137 | 350 | 350 | 303 | 312 | 235 | 246 | 285 | 330 | 82   | 97,5 | 71,5 | 82   | 10   | 230  | 329 | 336 | 350 | 302 | 350 | 350 | 350 |
| Prov. of Trent - Italy<br>Vigo Pansonage          | 91  | 0   | 100 | 100 | 82  | 100 | 100 | 100 | 100 | 40  | 100 | 64  | 100 | 0    | 10   | 23   | 0    | 0    | 100  | 54  | 76  | 100 | 87  | 76  | 100 | 85  |
| Prov. of Trent - Italy<br>Town Hall               | 28  | 0   | 55  | 37  | 55  | 100 | 100 | 28  | 37  | 55  | 73  | 46  | 55  | 82   | 60   | 10   | 82   | 10   | 0    | 100 | 100 | 100 | 100 | 100 | 100 | 91  |
| Prov. of Alessandria - Italy<br>Ovada I           | 76  | 0   | 125 | 47  | 0   | 125 | 125 | 125 | 125 | 93  | 34  | 125 | 125 | 0    | 0    | 0    | 0    | 0    | 85   | 125 | 125 | 125 | 65  | 125 | 125 | 125 |
| Prov. of Alessandria - Italy<br>Ovada II          | 14  | 50  | 34  | 10  | 0   | 41  | 37  | 50  | 50  | 47  | 39  | 50  | 50  | 0    | 27,5 | 38,5 | 0    | 0    | 45   | 50  | 35  | 50  | 50  | 50  | 50  | 50  |
| Prov. of Alessandria - Italy<br>Ovada III         | 250 | 250 | 250 | 105 | 100 | 120 | 120 | 0   | 10  | 30  | 50  | 50  | 50  | 65   | 75   | 145  | 132  | 152  | 175  | 111 | 140 | 120 | 117 | 65  | 65  | 225 |
| Prov. of Alessandria - Italy<br>Peano Enlargement | 150 | 150 | 150 | 50  | 65  | 65  | 65  | 0   | 0   | 0   | 0   | 0   | 0   | 65   | 0    | 45   | 52   | 52   | 75   | 65  | 65  | 65  | 65  | 65  | 150 |     |
| Prov. of Alessandria - Italy<br>Peano Gymnasium   | 50  | 50  | 50  | 25  | 25  | 25  | 25  | 0   | 0   | 0   | 0   | 0   | 0   | 50   | 25   | 50   | 50   | 50   | 50   | 25  | 25  | 25  | 25  | 0   | 25  |     |
| Prov. of Alessandria - Italy<br>Palazzo Edilizia  | 50  | 50  | 50  | 30  | 10  | 30  | 30  | 0   | 10  | 30  | 50  | 50  | 50  | 50   | 50   | 50   | 30   | 50   | 50   | 21  | 50  | 30  | 27  | 0   | 50  |     |
| EURAC - Italy<br>Brunneck                         | 156 | 185 | 175 | 77  | 102 | 123 | 42  | 0   | 130 | 55  | 109 | 75  | 75  | 133  | 172  | 85   | 191  | 182  | 132  | 129 | 129 | 50  | 132 | 0   | 123 | 15  |
| EURAC - Italy<br>Mühlen                           | 156 | 185 | 175 | 77  | 102 | 123 | 42  | 0   | 130 | 55  | 109 | 75  | 75  | 133  | 172  | 85   | 192  | 183  | 132  | 129 | 129 | 50  | 132 | 0   | 123 | 15  |
| EURAC - Italy<br>Lajon School                     | 875 | 695 | 999 | 559 | 525 | 815 | 704 | 561 | 652 | 607 | 685 | 595 | 675 | 548  | 602  | 569  | 597  | 547  | 780  | 755 | 817 | 716 | 772 | 583 | 777 | 890 |

Fonte: ENERBUILD Final Result 6.2-4 ENERBUILD Tool: Transnational Pilot Testing on 45 Buildings (DI Mag. Markus BERCHTOLD, 2012)

## Action 6.3 valutazione dello strumento su edifici campione – pubblici o a uso pubblico e costruiti da meno di 5 anni

### Vigo Rendena Town Hall



## Action 6.3 valutazione dello strumento su edifici campione – pubblici o a uso pubblico e costruiti da meno di 5 anni

### Vigo Rendena Town Hall

#### Evaluation ENERBUILD-Tool – Building in planning phase

##### Vigo Rendena town hall



Picture outside



Picture outside



Picture outside

#### 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 <sup>2</sup> (net) | 505,96 m <sup>2</sup>                                                                         |
| Additional private uses                               | -                                                                                             |
| Total effective area in m <sup>2</sup>                | 505,96 m <sup>2</sup>                                                                         |
| 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.                                                                                  |

- A. Problematiche relative alla valutazione dell'edificio con ENERBUILD Tool
- B. Suggerimenti per il miglioramento dell'ENERBUILD Tool
- C. Valutazione e analisi critica dettagliata dei criteri

GOLD level – Versione LEED 2.2 NC – ottobre 2011

## Action 6.3 valutazione dello strumento su edifici campione – pubblici o a uso pubblico e costruiti da meno di 5 anni

### Vigo Rendena Town Hall

| Results |   |                                                                                                                                          |                                           |                |                     |
|---------|---|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------|---------------------|
| Nr.     |   | Title                                                                                                                                    | Must<br>criteria<br>(M); min.<br>standard | max.<br>Points | evaluated<br>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 ofr energetic optimization                                                                                              |                                           | 60             | 35                  |
| B       | 6 | Information of users                                                                                                                     |                                           | 25             | 0                   |
| C       |   | Energy & Utilities                                                                                                                       |                                           | 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 | CO <sub>2</sub> -emissions (PHPP)                                                                                                        |                                           | 50             | 50                  |
| D       |   | Health and Comfort                                                                                                                       |                                           | max. 250       | 120                 |
| 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       | 123                 |
| E       | 1 | OI <sub>3,TGH,c</sub> ecological index of the thermal building envelope (respectively OI <sub>3</sub> of the total mass of the building) |                                           | 200            | 75                  |
|         |   |                                                                                                                                          | Sum                                       | max.<br>1.000  | 675                 |