BELGIUM

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Skills, training and knowledge case study:

REGAIN

Description:

"REGAIN" is the acronym for "Reducing the Greenhouse Effect Through Alternative Industrial Estate Management in North-West Europe", an INTERREG IV research project[1] designed to develop a transnational method for the conception of semi-industrial buildings integrating industrial process (or craft industry) and offices, with very low energy consumption and very high environmental quality. Four countries, main investment partners, were associated in this project, represented by managers of business parks or of local communities and builders of pilot buildings: Belgium (represented by the Economy Bureau of the Province of Namur), France (SIZIAF), Wales (Blaenau-Gwent) and Scotland (SETIC). Two more partners participated as support: Italy (Envipark) and France (PALME).

The project foresaw the construction of four pilot buildings, on the four main investment partners' sites. These buildings had to be business incubators (welcoming and helping start-ups with their business, at a reasonable rent cost) with high energy and environmental performances. Reproducibility, as the main goal, makes cost optimization another important objective.

The site chosen to build the Belgian prototype is the *Scientific Park Crealys*, close to Namur, recently ISO 14001 certified.

One of the specificities of the project was the early involvement of various construction sector actors, in order to guarantee results from an early conception stage. In the Belgian case, the technical brainwork team was composed of the REGAIN project managers and contracting authority (the Economy Bureau of the Province of Namur[2]), the architect (Alain STEVENS), HVAC engineers, construction site security coordinators, and the EnergySuD research unit of the University of Liege, expert in energy and environmental performances assessment.

This integrated working method, a key aspect of the building's conception, is not yet usual in the building industry. Often, exchange between specialists is minimal, due to the separation of tasks, the inertia of the building sector and the weight of tradition in project management. But a strong will to get the best skills and knowledge when needed led to a warm welcome of every actor, from the early conception stages, to attend regular meetings, share views and knowledge, and to participate in technical assistance studies.

This method allowed early and direct confrontation of various expertise and views on the project. Economically speaking, the choice was to develop a concept and a design which cost would be as much as possible comparable to a "traditional" building, yet with the highest Belgian energy efficiency

[1] http://www.programme-regain.eu/
[2] http://www.bep.be/

possible level. The resulting building, inaugurated in February 2011, is composed of a passive office wing and a “very low energy” industrial (workshops) wing.

Fig. 1: REGAIN Belgian office building.

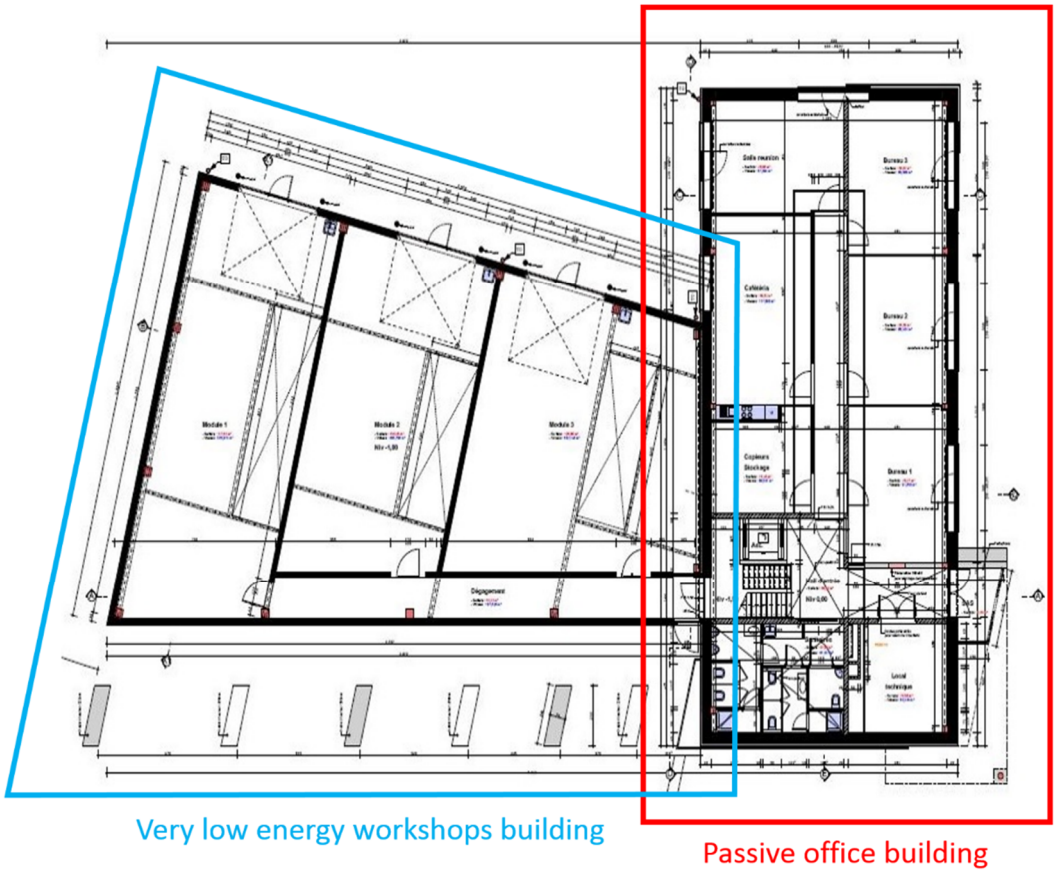

Fig. 2: Ground floor plan of the REGAIN Belgian building.

Fig. 3: “Passive certified Offices by the Passive House Platform” and Regain logo on the entrance of the building.

The building displays interesting solutions:

- Obviously, a very efficient envelope, characterised by an average office wing U-value of 0.2W/m²K, and blower door test result (n50) of 0.5vol/h.
- Solar and internal gains have been studied, so that the annual heating and cooling demands, calculated with the passive house software, should both stay below 15kWh/m².yr.
- Only 10W/m² (or around 5kW in total) of power is therefore needed to heat up and cool down the building. Such low powers are hard to come by on the market, so that it has been decided by the technical team to heat and cool through ventilation air flows.
- Ventilation has been carefully conceived, by constantly regulating the flows to the actual needs, and by using a heat exchanger to recover the calories. Given what has been said before, air flows can be increased when needed, whether to heat up in winter, or to cool down in summer.
- The natural light use has been maximized, and the use of artificial light reduced and optimized.
- There is no air condition system, but a free cooling system. The comfort for the users has been taken into consideration: a passive building keeps more easily a constant temperature.
- The building materials that have been used were chosen taking into account the embodied energy.
- The industrial hall “only” reaches the low energy standard; it has been proved that better performance is unnecessary (given the use these spaces will be put to, higher insulation and air tightness would only increase overheating risks, even in winter).

Regular meeting were organised to gather national teams, in order to stimulate the dissemination of skills, knowledge, research results and chosen solutions. Another objective of the project was the stimulating comparison of the environmental performances between projects, with a common evaluation method. Each participating country, therefore, built a similar project, and the European funded project allowed share of experience and performance results. In order to get past the “only” (and often main) criterion of sustainability when applied to buildings, energy, an agreement on the environmental performance evaluation was necessary. There exists many frames of reference[3] that include crucial criteria (such as water consumption, materials selection and integration into the

[3] “HQE” in France (High Environmental Quality), BREEAM in Wales…

landscape), but most of them are calibrated on national context[4], so that it soon appeared necessary to find common ground as far as criteria selection, weighting and benchmarking are concerned.

Therefore, the chosen method for the REGAIN initiative was SB-Tool (free international Sustainable Building Tool, www.iisbe.org), devised under the framework of *the International Green Building Challenge*, which saw the participation of international organisations and institutions from 25 countries. Its methodology can be applied to any type of building and adapted to every geographical and regulatory context, no matter what the local construction practices are. It allows inclusion of energy analysis, but also evaluation of the wider social and environmental aspects, e.g. materials, construction techniques and users' comfort. It considers the entire lifespan of the building: design, construction, occupancy, potential adaptation to future use, until demolition.

A	**Site Selection, Project Planning and Development**
A1	Site Selection
A2	Project Planning
A3	Urban Design and Site Development
B	**Energy and Resource Consumption**
B1	Total Life Cycle Non-Renewable Energy
B2	Electrical peak demand for facility operations
B3	Renewable Energy
B4	Materials
B5	Potable Water
C	**Environmental Loadings**
C1	Greenhouse Gas Emissions
C2	Other Atmospheric Emissions
C3	Solid Wastes
C4	Rainwater, Stormwater and Wastewater
C5	Impacts on Site
C6	Other Local and Regional Impacts
D	**Indoor Environmental Quality**
D1	Indoor Air Quality
D2	Ventilation
D3	Air Temperature and Relative Humidity
D4	Daylighting and Illumination
D5	Noise and Acoustics
E	**Service Quality**
E1	Safety and Security During Operations
E2	Functionality and efficiency
E3	Controllability
E4	Flexibility and Adaptability
E5	Commissioning of facility systems
E6	Maintenance of Operating Performance
F	**Social and Economic aspects**
F1	Social Aspects
F2	Cost and Economics
G	**Cultural and Perceptual Aspects**
G1	Culture & Heritage
G2	Perceptual

Fig. 4: SB-Tool complete list of assessment criteria

[4] The same construction methods can produce different results depending on location. Among the local contextual aspects to consider, there are laws and regulations in operation which can demand or suggest particular standards or references to reach.

More meetings were organised, where the REGAIN committee (members from each participating country) gathered to reach an accord for common criteria. For example, the choice of the building site, with regards to its natural environment is to be evaluated identically in each country. Then each country team set their own national benchmark for offices and workshops for other criteria, for example, the evaluation of the acoustic performance within primary occupancy areas depends on national laws and standards.

Furthermore, a correct assessment of the project requires a reliable database for all the materials used. The project witnessed the lack of accessible and transparent information from material producers, as far as the environmental and sanitary characteristics of the materials are concerned, so that great difficulty came from the collection of data from architects and engineers. It is believed that, in the future, environmental certification could grow in importance (at least for “big” projects), so that products databases could be built up; in REGAIN project however, only the information needed for the assessment of these buildings were gathered.

A first assessment of the environmental performance of the Belgian building was done during the design phase, with regards to the weight allocated to each category, and values estimation which had to be checked after the occupation of the building. The global result during the conception of the Belgian building was 3.4 out of 5; a score of 0 represents a building conform to the good practice or the national (or regional) laws, while a score of 5 corresponds to technically accessible perfection. The following graph illustrates the average result for each category. The “G” category (culture), has been considered inapplicable to the 4 projects.

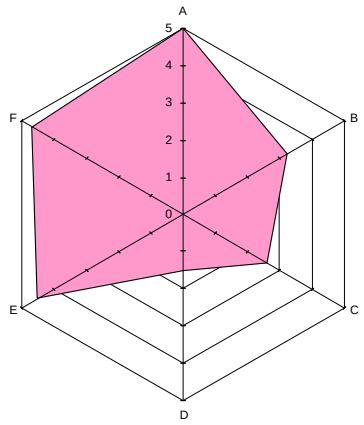

Fig. 5: star graph of the environmental performance assessment of the Belgian case building, on SB-Tool

The crucial dissemination of knowledge is at the heart of this project, through:

- The resort to skilled actors and research teams from the early conception stages, with the objective to get the knowledge when needed and therefore reduce delays and costs.
- The design of a framework document about clean building sites
- User sensitisation for a better experience from users; in a low energy or passive building, it is necessary to guide the users through the best way to use it, in order to reach maximal comfort, which is also visible through the quality and performance of services. Given that one of REGAIN objectives is to educate and train people, a users’ guide has been written and edited to accomplish this role as common base for any tenant to ensure the building’s best operation.
- Technical trainings for the building sector and for students, learning on green worksite, specific techniques. All 4 buildings, on all 4 members’ sites, serve as examples through on-site visits of

professionals or technical explanation of the chosen solutions, systems and materials. In 2014, 787 people came to the Belgian building, and were given different levels of information, depending on their interests. Among these people, 96 pupils came from primary schools, and 400 from secondary schools (building oriented); 45 were job seekers who underwent building training (searching for additional knowledge), others were stakeholders from green building clusters or companies involved in the sustainable building or management of semi-industrial buildings… It has been recently visited by the members of the Cap2020 cluster, a group of Walloon companies active in the building industry, who adopt and pursue the 2020 European objective of massive energy consumption reduction applied to buildings.

- The dissemination of results: the project being financed by *INTERREG IVB NEW,* a financial instrument of the European Union's Cohesion Policy, whose one objective was the exchange and comparison of results of four experiments in European construction and make them available for local, national and European communities.
- The continuation of the project: REGAIN Extension has begun in 2014. Among its goals:
    - The realisation of two pilots building (extensions of the Belgian and French buildings of Regain 1), with a green focus on the working site.
    - Access to loans and other investments for project initiators is at the heart of the creation of decision-making software for investors and financiers, showing swift return on investment evaluations and priority evaluation of a new mixed building to build.
    - The organisation of participative workshops for students, and technical training on working site. A didactic interactive course will be organised for future trainings.
    - Users' awareness to this kind of building's use will be raised through the development of a specific innovative signage.

The continuous environmental performance evaluation accompanying the project has given more powerful projects: the Belgian Regain building received the best score of all building cases used to calibrate the Belgian referential of sustainable buildings, common to the three Belgian Regions. This project has therefore enabled to advance in the theoretical aspects of the environmental certification by setting benchmarks for each country, but also to see the difficulties in implementing a method of certification in practice.

For more information:

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