EULEB
EUropean high quality Low Energy Buildings

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ABSTRACT: The EULEB-Project is intended to supply information to architects and engineers throughout Europe and beyond it. Within the EU it will support the new Energy Directive on Buildings through providing design and engineering details of European public high quality buildings with low energy consumption. By providing a CD containing information on architecture, energy consumption and economical efficiency as well as the comfort of these innovative buildings in use, the lack of information on low energy architecture and the prejudices many people have against it shall be eliminated. The CD will be distributed by magazines and seminars.
The building selection consists of educational buildings, office buildings and leisure facilities in nine European countries. Thus different climatic zones from Scandinavia to Greece will be considered and lead to different backgrounds when evaluating the respective buildings. Besides the energy performance of the buildings, the user acceptance will be evaluated by using post occupancy studies.

Keywords: low energy architecture, awareness, information, methods

1. INTRODUCTION

"Low Energy Buildings are not working properly, cause lots of problems, are too expensive and always badly designed"

These are only some of the most common prejudices many people still have against low energy architecture.

Others just do not really know "low energy architecture" and therefore keep their provisos against the unknown.

Some may also have heard about bad examples that remain in their memories.

These prejudices and the lack of information have to be corrected in order to tap the full potential of low energy buildings in the context of energy saving and reduction of greenhouse gas emission.

2. PROJECT OVERVIEW

2.1 Objectives

By supplying information on architecture, energy consumption, economical and ecological efficiency as well as the comfort of existing innovative buildings throughout the EU, this project intends to eliminate the forenamed prejudices and ignorance.

Therefore a CD will be created, providing detailed information on the significant parameters of exemplary buildings in the EU and the experiences in use. The CD will be distributed by magazines and seminars.

Students, who are the key market actors of the future, will be informed about the project during special lectures.

2.2 Target Groups

The target groups are the main market actors like public clients, investors and property developers as well as architects and engineers with their local, national and European organisations.

2.3 Functionality and Content of the CD

The EULEB project is focused on public buildings. More precisely, the buildings analysed belong to one of the following categories

- Local government office buildings
- Educational buildings (kindergartens, schools, universities, libraries)
- Leisure facilities (museums, sports halls, theatres etc)

The CD will be computer-based and navigable by either choosing the individual project or the particular technology. It will therefore include:

- Plans/sections and photographs of the building, visualising the architecture
- Climatic data of the building locations
- Details of technologies including diagrams of operation principles and photographs.
- Analysis of energy savings associated with the technologies
- Evaluation of indoor comfort
- Cost/benefit analysis of the technologies
- Videoclips about the buildings

The content of the CD will be offered in English, French, German, Italian and Spanish language in order to address a large number of people.

2.4 Dissemination activities

The CD will be distributed as inserts in architectural and/or engineering magazines in the various countries. In total it is expected that 150.000 CDs will be produced.

Already during the project work of two years permanent dissemination activities will be executed in order to reach a large number of key actors and increase the interest in the consecutive results.

Participation in conferences, fairs and seminars are suitable ways for these dissemination activities as well as periodical dissemination of the current project results through articles in professional journals.

2.5 Project Team

The team project team consists of five European Universities and one European Association. The project is coordinated by the Chair for Environmental Architecture at the University of Dortmund, Germany.

	Universität Dortmund, Lehrstuhl für Klimagerechte Architektur
	London Metropolitan University, LEARN
ABITA	Università degli Studi di Firenze, ABITA
LEPTAB	Université de La Rochelle, LEPTAP
UPC	Universitat Politècnica de Catalunya
rehva	Federation of European heating and air-conditioning associations

Figure 1: List of project partners

3. WORK PROGRESS

3.1 Selection of Buildings

The selection of buildings has been finished. A total of 50 buildings have been identified, predominantly from the countries where the University partners are situated. To cover the large variety of climatic conditions in Europe buildings from the very far north were included as well as from the very south of Europe.

Out of the identified buildings, there had to be a selection of 4-5 buildings per partner for further examination.

For the selection of buildings a simple evaluation system was designed. In this first step, each building was evaluated concerning its qualification to the project. Seven categories (such as quality of architecture, energy consumption, availability of monitored data etc.) with different weightings were used in this subjective evaluation methodology. Low ratings in some of the criteria had to lead to a direct exclusion of a project (for example lack of monitored data).

EULEB - First evaluation of buildings

Building information:

Short Name:	Examp
Name:	Example building
Country:	no man´s land
Climatic zone:	Alwaysnice
Occupancy:	Educational

Evaluation:

No.	Criterion	rating	weighting	weighted rating
		1 (bad) to 10 (good)		
1)	Good Design, preferably award winning buildings	5	20%	1,0
2)	Low Energy Consumption (heating. ventilating, cooling, lighting)	8	20%	1,6
3)	Advanced technologies for building and services	2	15%	0,3
4)	Renewable energy utilisation and integration (solar thermal, PV, biomass, geothermal etc)	9	15%	1,4
5)	High comfort solutions (thermal, ventilation and lighting)	1	10%	0,1
6)	Availability of monitored energy consumption or easily measurable	8	10%	0,8
7)	Availability of financial data relating to energy saving features (RUE and RES)	4	10%	0,4
	Overall rating		**100%**	**5,6**

This evaluation systems leads to comparable evaluation of the suitability of buildings for the EULEB-project. Within the different climatic zones in Europe (south, middle, north), the buildings with the highest overall-ratings should be selected for further treatment.
Therefore, the different climates, building technologies and cultural apsects of the European Countries have to be taken into account for the assessment of the several criteria.

Figure 2: First evaluation of buildings

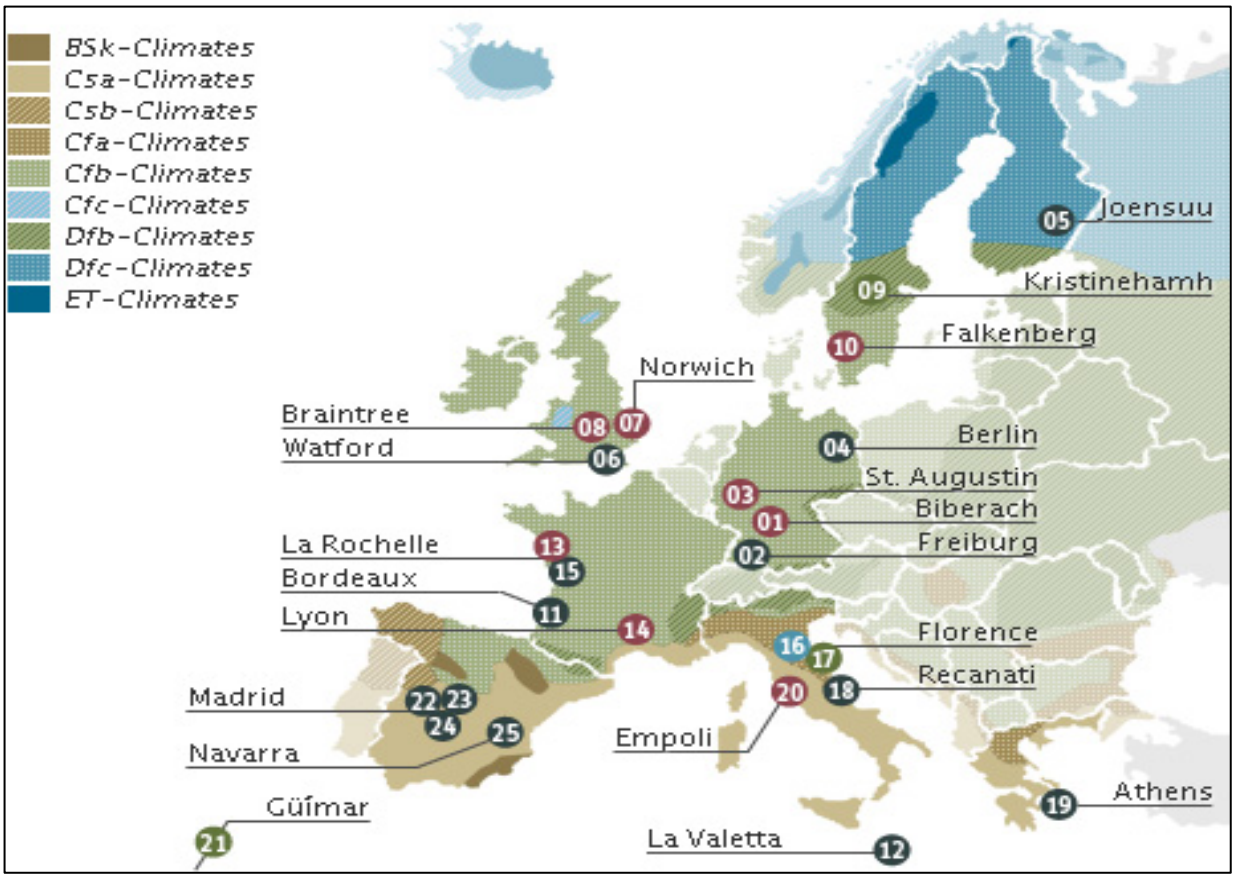
After having evaluated the 50 indentified buildings, a ranking of the buildings identified by each partner could be established. This process led to the selection of 25 buildings from all over Europe.

Table 1: List of buildings selected for EULEB

Name	Occupancy	Country	City
Gebhard-Müller-Schule	Educational	Germany	Biberach
Fraunhofer ISE	Office	Germany	Freiburg
FH Rhein-Sieg	Educational	Germany	St. Augustin
EnergieForum Berlin	Office	Germany	Berlin
Main Office and R.C.of Finnish Forest Reseach Institute	Office	Finland	Joensuu
BRE Office	Office	England	Watford
Elizabeth Fry	Educational	England	Norwich
Great Notley School	Educational	England	Braintree
Kunst Museum	Leisure	Sweden	Kristinehamh
Tanga School	Educational	Sweden	Falkenberg
Malta Stock Exchange	Office	Malta	La Valetta
County Hall La Rochelle	Office	France	La Rochelle
Maison de la	Office	France	Strasbourg

region Alsace			
Lycée Polyvalent Albert Camus	Educational	France	Fréjus
Lycée Pic St-Loup	Educational	France	St Clément de Rivière
New Meyer Hospital	Educational	Italy	Florence
Bardini Museum	Leisure	Italy	Florence
Guzzini headquarters	Office	Italy	Recanati
«AVAX» S.A. Headquarters	Office	Greece	Athens
Primary School	Educational	Italy	Empoli
Ethnographic Museum	Leisure	Spain	Güímar, Tenerife (Canary Islands)
Centre of Nature	Leisure	Spain	Les Planes de Son (Lleida)
SANITAS-BUPA Headquarters	Office	Spain	Madrid
National Centre of Renewable Energies	Office	Spain	Navarra
Association of Telephone Telecomunicati ons ATAM.	Educational	Spain	Sevilla

Figure 3: Location of EULEB-Buildings against the background of climate classification acc.to KOEPPEN (© www.reginamueller.de)



3.2 CD Content Structure

A CD content structure has been created, enabling easy access to the different types of information on the CD:

- General data
- Outdoor & indoor climate
- Building technology
- Technical systems
- Special features
- Energy performance
- Monitored comfort
- User acceptance
- Financial data
- Manufacturers of crucial features

The navigation will provide the possibility to screen the buildings according to certain countries, climatic zones, occupancies or a certain advanced technology applied in the buildings.

Furthermore certain special features will be highlighted, explained and described in detail. These features will be grouped in categories, such as

- Heat insulation
- Solar control
- Lighting
- Heating
- Cooling

- Ventilation
- Materials
- Renewable Energies
- Co-generation
- Rainwater use.

3.3 Climatic classification

The very different climatic situations in Europe (see figure 3) lead to different energy consumptions and also to different design strategies.

The climatic classification system created by ASHRAE [1] can be used to relate the energy consumptions of buildings to the climatic circumstances in which a building is located.

The ASHRAE system is originally based on the traditional (related to vegetation) and well-known system by KOEPPEN. For the context of energy in buildings the KOEPPEN-classification was extended by calculation of heating and cooling degree days.

ASHRAE created and applied this system to the climatic situation in Northern America. A transfer to European climates seems to be possible with slight adaptations.

The calculation of cooling degree days on a base of 10 °C used by the ASHRAE-classification represents the standard of building regulations in the USA and the respective indoor design temperatures. Taking this into account, the ASHRAE classification can be seen as a basis for comparing the energy performance of buildings in different climates.

Figure 4: Classification of selected Buildings according to ASHRAE 4611, CDD base 10°C

But as the design- and operating-temperatures in Europe usually differ a lot from those in the USA, a modification of the calculation base (for example 18 °C) for the cooling degree days seems to be necessary.

However the diagram shown in figure 4 makes obvious, that the selected locations result in different conditions, some of which are rather heating or cooling dominated, some are mixed climates.

4. NEXT STEPS

4.1 Data Collection

When submitting this paper the collection of the different data of the selected buildings is in progress and will be finished by summer 2006.

4.2 Visualisation of Data

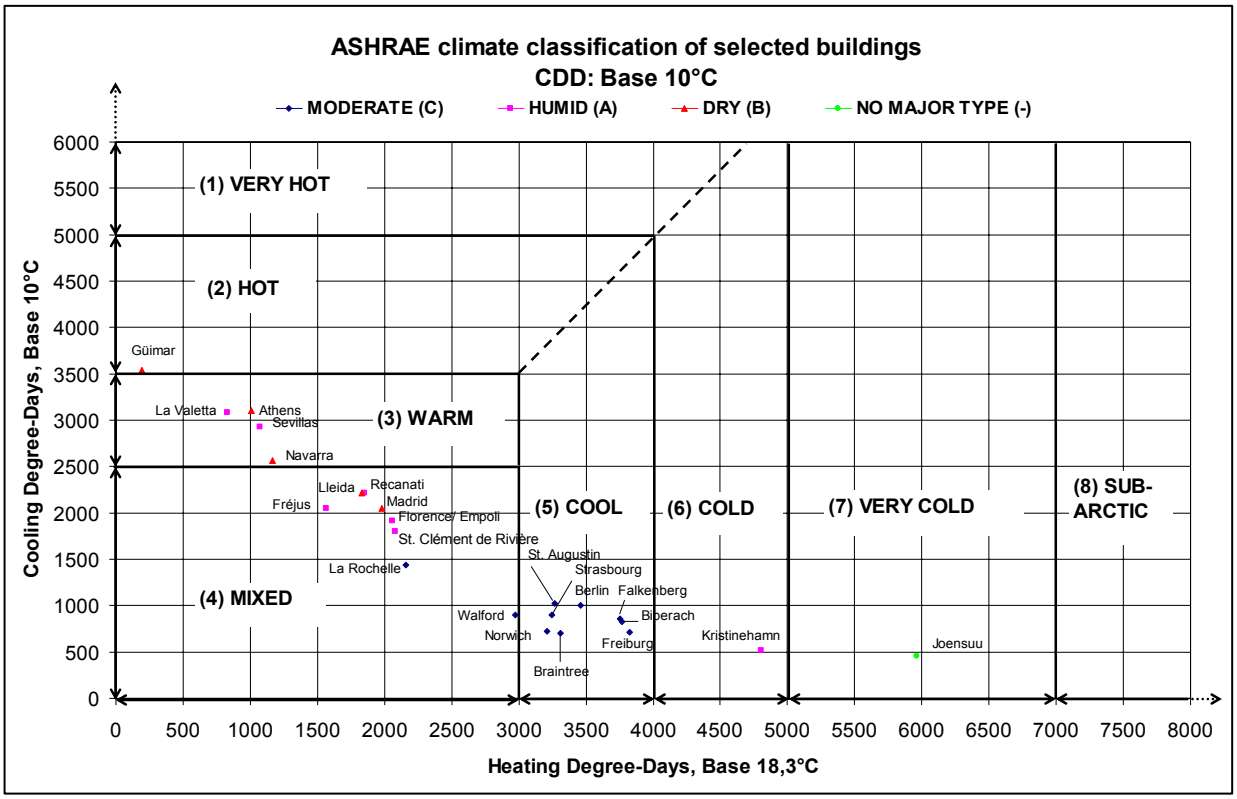
The visualisation of data also has been defined to ensure a homogenous appearance and good legibility. This applies to the selection, design and size of Plans, diagrams, tables etc.

When submitting this paper, the collected data are processed according to these guidelines.

4.3 CD content structure

The design of the CD content structure has been defined and is under technical realisation when submitting this paper.

The navigation will be easily understandable and will provide a good orientation for the user as well as an unerring access to the specific data.



4.4 Creation of Videos

For each selected building a short video clip will be produced and presented on the CD. The videos will provide additional information on the building itself and its environment as well as information on the building performance and advanced technologies.

4.5 CD Construction and Translation

Once the construction of the structure has been finished, all the contents collected have to be filled in and translated into English, German, French, Spanish and Italian. In the end a total number of 150.000 multilingual CDs will be produced.

4.6 Dissemination

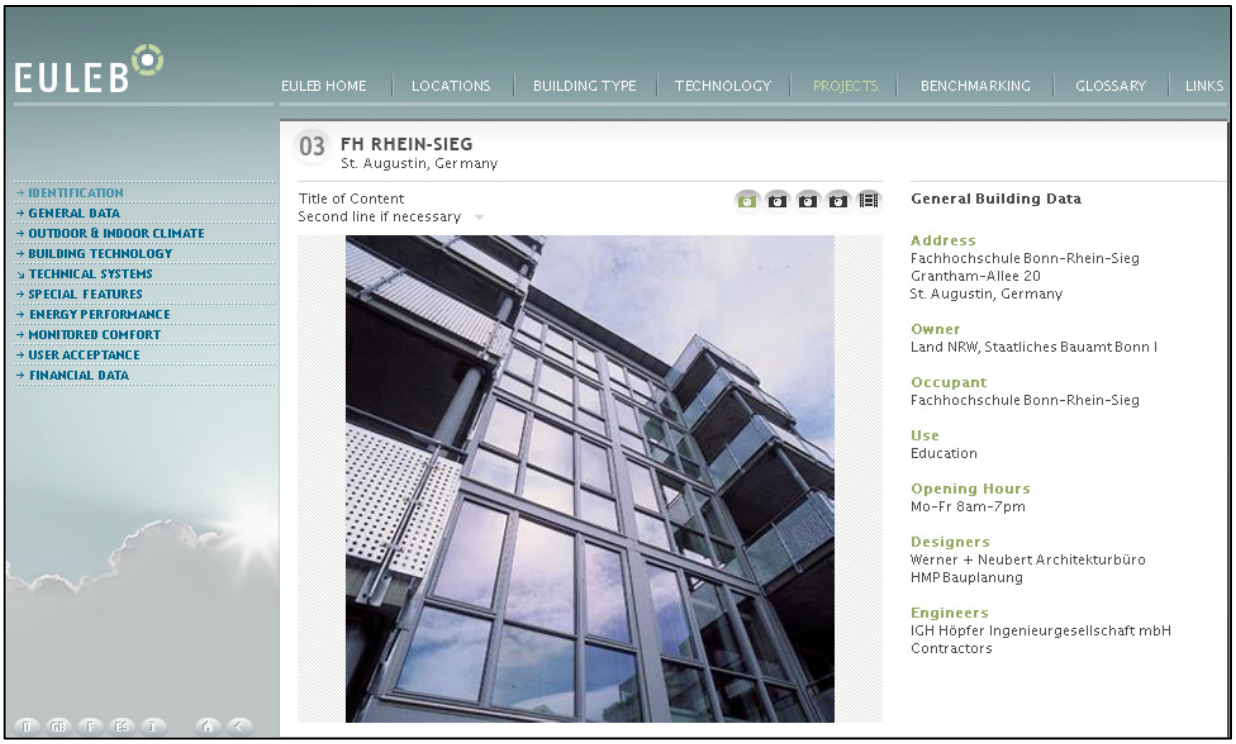
The CDs will be disseminated as inserts in magazines and presentations on seminars, workshops and fairs. In special lectures students of the partner universities will be informed about the project.

The dissemination activities should cover a large variety of target groups. Therefore journals and associations of different professions have been and will be contacted.

5. CONTACT

You will find more and updated information on our Project-website: www.EULEB.info

Figure 5: Draft version of the EULEB-layout (© www.reginamueller.de)



ACKNOWLEDGEMENT

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Intelligent Energy Europe

Figure 6: Support by the European Commission

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[1] R. S. Briggs and R. G. Lucas and Z. T. Taylor, ASHRAE 4610/4611 – Climate Classification for Building Energy Codes and Standards, ASHRAE 2003.