TRAINING FOR RENOVATED ENERGY EFFICIENT SOCIAL HOUSING

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Summary

The European project TREES project aims to integrate energy efficiency in continuing education of architects and social housing managers. Educational material has been elaborated, and reviewed by a users club including teachers. Workshops have been organised in order to collect feed back from the users and to prepare the integration of the material in courses. A first version of the material has been distributed to reviewers, the final version will be available end of 2007.

The material includes slides and texts structured in sections, so that teachers can select relevant parts according to their audience and context: techniques (insulation, glazing, ventilation, solar systems…), tools (energy and cost calculations, environmental impact assessment…), and case studies.

Keywords: Training, social housing, renovation, energy efficiency

1 Introduction

Numerous European research and demonstration projects concerned the improvement of thermal performance of buildings, but the dissemination of the results remains limited in the professional practice and education, the knowledge level being very different among European countries. Much effort has been dedicated to new buildings, though much more energy is consumed in the existing building stock. This high energy consumption has dramatic consequences for low income families (“energy poverty”). A focus on social houses would have very positive environmental and economic effects. Such a policy would also influence the rest of the building sector.

The implementation of the European Directive on the energy performance of buildings (December 2002) will impulse some changes that require innovation and skill. The aim of the presented project TREES is to organize collaboration between researchers – or professionals dealing with innovation – and teachers, in order to integrate new

knowledge in training: architecture courses and continuing education of social housing managers.

2 Description of the work

Important decision makers in social housing renovation are the managers in social housing associations or companies, and architects. These groups are therefore targeted and appropriate educational structures are contacted in order to constitute a users group to whom the deliverables are proposed for a review and exploitation.

The renovation of social houses is a specific topic. It is therefore preferable to develop modular educational material that can be used in a flexible way within more global courses (e.g. continuing education of architects, building managers etc.). An internal review among the partners allowed the collaboration to be strengthened, so that the material integrates European best practice.

The users group has been invited to workshops: the produced material has been presented and evaluated, then its implementation in courses is being discussed. The partners have evaluated this feedback and are adapting the material. The final deliverable will then be made available on the internet end of 2007, ready to be used in courses.

The final product is in the form of texts and overheads in English. Advanced technologies[1] are described by specialists (e.g. integrating solar hot water systems on a roof, preheating ventilation air, insulating and reducing thermal bridges). Tools are proposed (e.g. thermal simulation, life cycle assessment), allowing to assess the interest of these technologies in terms of energy saving and improvement of environmental quality. The presentation of case studies (e.g. European demonstration projects) illustrates the approach and professional good practice. The material could eventually be translated for replication in various countries. Harmonisation of the knowledge at a European level will help to promote good practice, particularly in the new member states.

The material, structured in sections, is presented in the next §.

3 Techniques

3.1 Insulation and thermal bridges

The contents of this section are the following: Insulation materials and their characteristics, insulation systems for low energy and passive house standards, arguments for high insulated buildings, application of vacuum and transparent insulation materials, typical thermal bridges and their avoidance, reasons for air tightness, planning air tightness, solutions for critical parts at facade and roof..

3.2 Replacement of glazing

The topics addressed here are: heat losses and solar transmittance factor of various glazing types, evaluation of the solar exposure of a façade, choice of a glazing according to the

[1] Advanced technologies is related to a present standard practice: such technologies allow the energy performance of buildings to be improved compared to a standard renovation. For instance heat recovery on ventilation air is advanced compared to a standard mechanical or natural ventilation system.

climate, orientation and exposure, heat gains and losses balance for different glazing types, influence of glazing replacement on the heating energy consumption of a building

3.3 Ventilation

This section addresses the following issues:
- Introduction to various ways of preheating ventilation air through passive means, like glazed balconies, air collectors and ground tubes
- Integration of preheating of ventilation air in energy efficient and passive house energy concepts for existing and new buildings
- Main characteristics, energy and comfort aspects
- Examples of projects applications of preheating ventilation air

3.4 Solar hot water

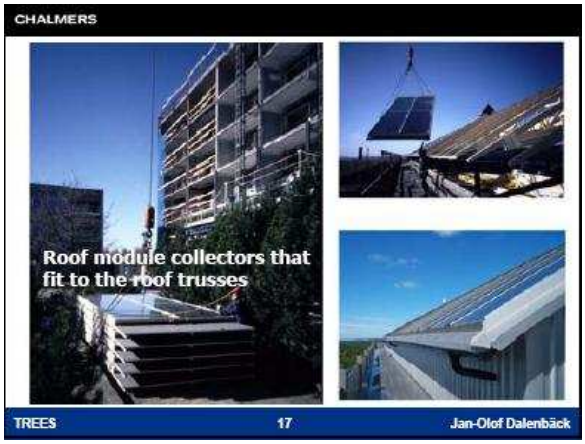
The material covers feasibility and design guidelines including simple hot water load estimations, design principles, system design alternatives, typical components and energy performance (savings), anc samples of building integration into various types of common building types.

3.5 Photovoltaic systems

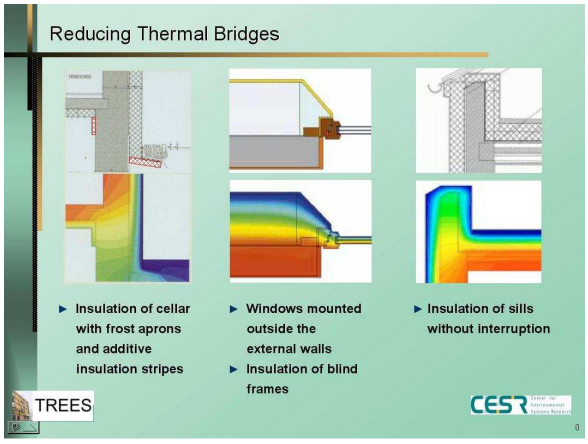
Photovoltaic systems and components, experience in the design and use, good practice in building integration are presented in this section.

3.6 Heating equipment

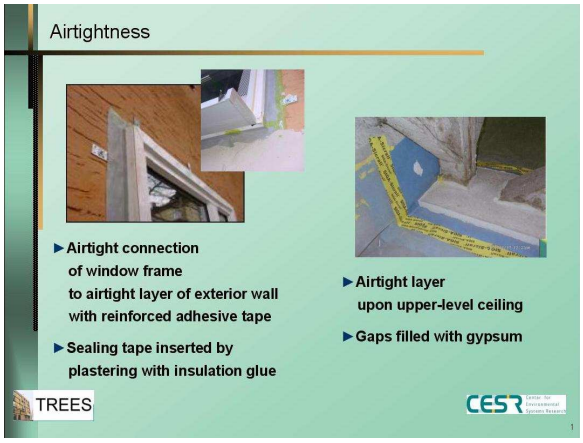
Among the items are: replacement of boilers (presentation of high performance boilers), possible energy change (e.g. fuel to gas or district heating), improvement of control (thermostat), choice of technical solutions according to e.g. the size of the building, examples.



Solar collectors avoiding to repair a terrace roof



Energy saving by reduced thermal bridge



Reducing air infiltration

Various ways of integrating PV collectors

Fig. 1 Example slides in the educational material, Techniques

4 Tools

A renovation project can benefit from different tools supporting the decision making process by allowing several alternatives to be compared and evaluated on several criteria: energy efficiency, environmental impacts, costs, sustainability issues etc.

This section presents several methods including the hypotheses and limits, validation or inter-comparison if relevant, list of tools and contacts of editors, example application in retrofit projects:

- Monthly heating load calculation
- Thermal simulation
- Life cycle assessment
- Sustainability assessment
- Cost calculation

Local community planning is also introduced, in order to demonstrate the relation between low energy demand, renewable energy applications and efficient technologies, to explain the link between urban planning, building density, and infrastructure. Examples projects with successful local community planning are presented.

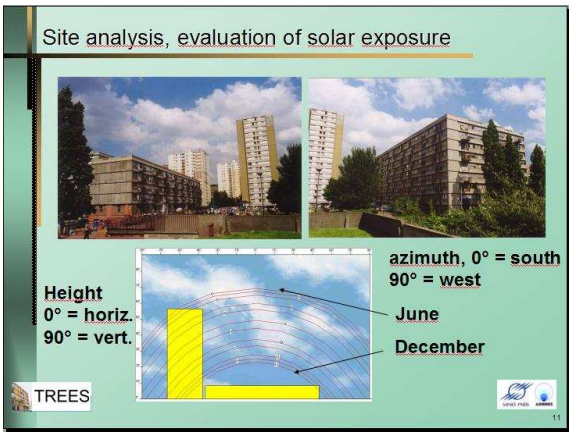
5 Case studies

The case studies presented in the educational material have been selected according to the following criteria:

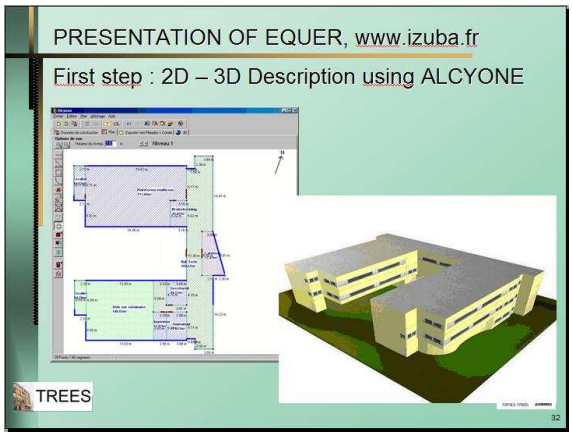
- Relevant illustration of techniques and / or tools presented in sections 1 and 2,
- monitoring, and availability of precise information on the performance, costs, and any relevant issue.

Each project is presented with a description of refurbishment concepts, realisation, costs, measurement results, and assessment for the following sites: Gårdsten (Sweden),

Dunaújváros (Hungary), Amsterdam (The Netherlands), Montreuil (France), Nürnberg (Germany), and Trondheim (Norway).



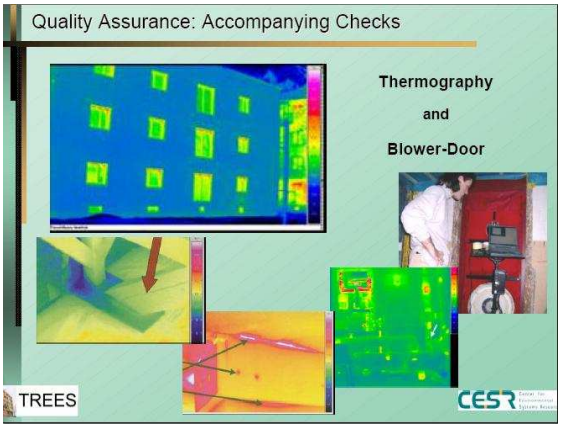
Analysing the solar exposure of a facade



Example life cycle assessment tool, data input

Fig. 2 Example slides in the educational material, Tools

Gårdsten, Sweden



Nürnberg, Germany

Montreuil, France

Dunaújváros Hungary

Fig. 3 Example slides in the educational material, Case studies

6 Outcome of the project

The elaborated material is proposed to the organisations involved in continuing education of the concerned professional target groups, and mainly:

- architecture schools or faculties
- continuing education organisations within social housing associations, at a national or local level

These structures can exploit the results of this project, and can promote the corresponding courses. It is planned to develop material that can be used in a flexible way within more global courses e.g.:

- continuing education of architects regarding the environmental quality of buildings,
- continuing education of social housing managers regarding the management of a retrofit project (feasibility, design, work follow up and commissioning).

The material aims to facilitate the preparation of courses by providing pictures showing best practice, and the corresponding explanatory texts. Teachers can then select overheads and adapt them according to a local context.

The implementation of the European Directive on the energy performance of buildings will require some new knowledge. Presently most social housing managers and architects do not pay much attention to energy performance because there is no requirement in the regulation for existing buildings. Integrating energy performance in continuing education therefore corresponds to a present need.

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