Training for Renovated Energy Efficient Social housing

Final brochure

Intelligent Energy -Europe programme, contract n° EIE/05/110/SI2.420021

Objectives

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, social 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) impulses some changes that require innovation and skill. The aim of the project TREES is to organize a 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.

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 planned 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 quality of the material to be improved by integrating 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 adapted the material accordingly. The final deliverable is available on the internet end of 2007, ready to be used in courses.

Results

The final product is in the form of texts and slides 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, cost calculation), allowing to assess the interest of these technologies in terms of energy saving, economy 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

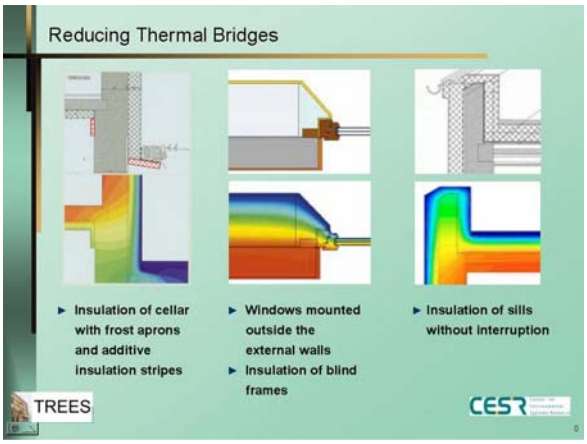
[1] Advanced technologies is related to a present standard practice : such technologies allow the energy performance of buildings to be improved compared to a standard renovation. For instance heat recovery on ventilation air is advanced compared to a standard mechanical or natural ventilation system.

eventually be translated for replication in various countries. Harmonisation of the knowledge at a European level helps to promote good practice, particularly in the new member states.

Example slides

Techniques

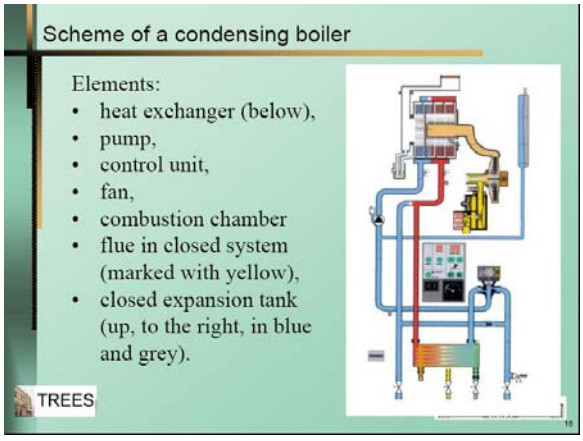
Solar collectors avoiding to repair a terrace roof



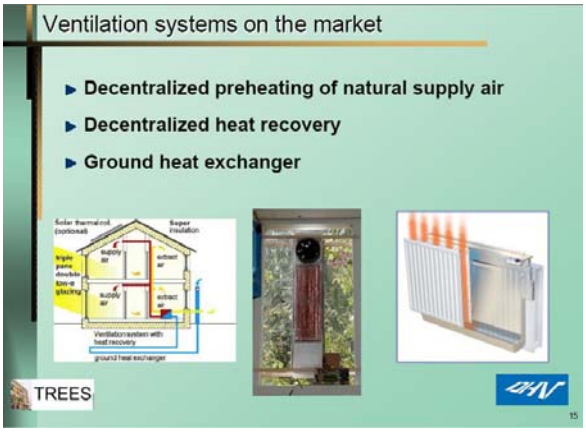
Energy saving by reduced thermal bridge

Reducing air infiltration

Various ways of integrating PV collectors

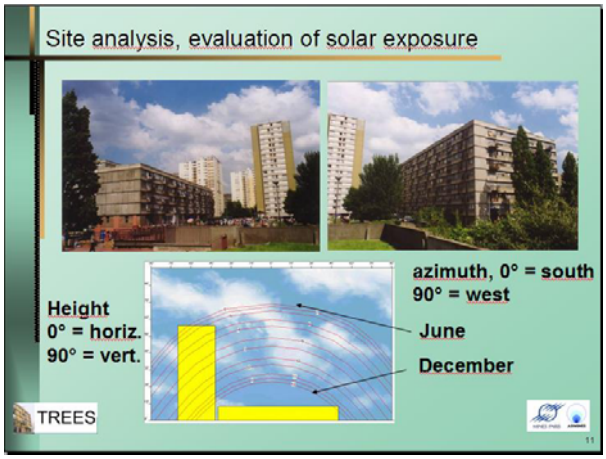


Implementing high performance equipment

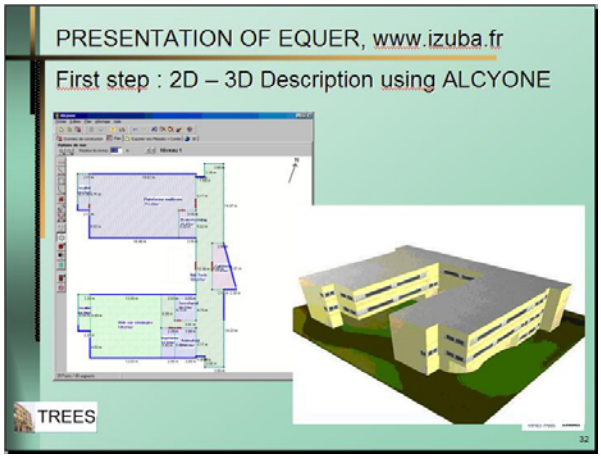


Innovative ventilation systems

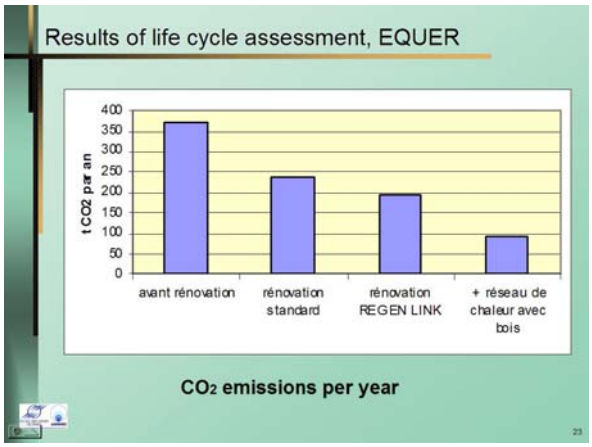
Tools



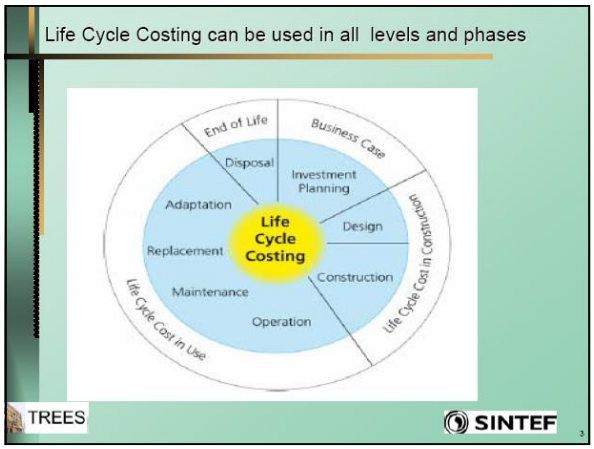
Analysing the solar exposure of a facade



Example energy and life cycle assessment tool



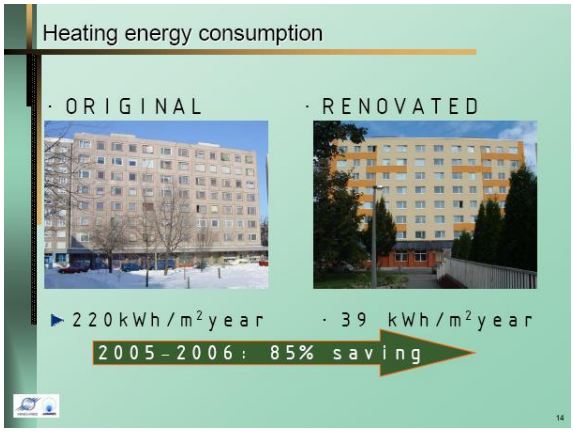
Evaluating the reduction of CO_2 emissions



Life cycle cost evaluation

Case studies

Gårdsten, Sweden



Dunaújváros Hungary

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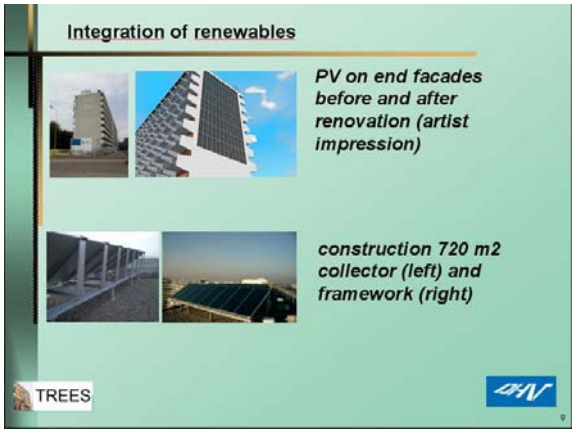
<td> 

Kruitberg-Amsterdam, The Netherlands</td>
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Montreuil, France</td>
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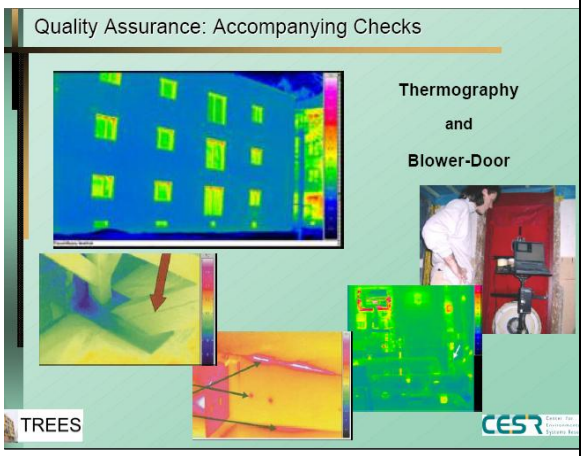
<td> 

Nürnberg, Germany</td>
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Husby, Norway</td>
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The contents of the material are the following.

1 Techniques

1.1 Insulation and thermal bridges

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

1.2 Replacement of glazing

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 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

1.3 Ventilation

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.

1.4 Solar hot water

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

1.5 Photovoltaic systems

Photovoltaic systems and components, experience in the design and use, good practice in building integration.

1.6 Heating equipment

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.

2 Tools

2.1 Simplified heating load calculation

Presentation of methods, hypotheses and limits, list of tools and contacts of editors, application in retrofit projects : comparison of design alternatives (energy consumption), sensitivity studies and main parameters.

2.2 Thermal simulation

Principles and models, main hypotheses and limits, tool validation and inter-comparison, list of tools and web sites, example application in the retrofit of social housing : reduction of the heating load obtained with various technical measures, sensitivity studies.

2.3 Life cycle assessment

Presentation of the method, assumptions, tool validation and inter-comparison, list of tools and web sites, example application in the retrofit of social housing : reduction of the environmental impacts obtained with various technical measures, sensitivity studies

2.4 Sustainability assessment

Presentation of relevant tools (e.g. Green building challenge) and examples applications.

2.5 Local community planning

Introduction to local community planning, in order to demonstrate the relation between low energy demand, renewable energy applications and efficient technologies. Explanation of the link between urban planning, building density, and infrastructure. Introduction to optimisation models, and their use in the planning process. Examples of projects with successful local community planning.

2.6 Cost calculation

Presentation of tools relevant for retrofit projects (e.g. element cost calculation) and example applications

3 Case studies

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

- High energy performance,
- 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.

Project presentation, refurbishment concepts, realisation, costs, measurement results, and assessment for the following sites : Gårdsten (Sweden), Dunaújváros (Hungary), Kruitberg-Amsterdam (The Netherlands), Montreuil (France), Nürnberg (Germany), and Husby (Norway).

Proposed consultation work and outcome of the project

Important decision makers in social housing renovation are :

- the managers in social housing associations or companies, and
- architects.

The elaborated material is proposed for a review to the organisations involved in continuing education of these 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. The material 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).

A first draft of the material has been provided early 2007. The feed back has been collected during a workshop organised in each participating country during spring 2007. The material is then being adapted according to this feed back and a final version will be available on the internet end of 2007, ready to be used in courses. The material aims to facilitate the preparation of courses by providing pictures showing best practice, and the corresponding explanatory texts. Teachers can then select slides and adapt them according to a local context.

The implementation of the European Directive on the energy performance of buildings will require some knew 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.

Acknowledgements

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Project web site

http://www.cep.ensmp.fr/trees/

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