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ProEcoPolyNet

Summary

Partners
Berliner Energieagentur GmbH - O.Ö.Energiesparverband (ÖÖ ESV) - Energy Consulting Network (EC-Net) - Austrian Energy Agency - University of Manchester - VDI - FEDARENE - FAST - Building and Civil Engineering Institute ZRMK - REHVA - Jozef Stefan Institute - COGEN Europe - Motiva Oy

ProEcoPolyNet - The Eco-Building Pole

The ProEcoPolyNet project was launched in May 2006 with as objective to contribute to the bundling and sharing of European Research know-how in three thematic interlinked areas: eco-buildings, small polygeneration and renewable energy heating and cooling technologies. The project will promote and disseminate Research results in these 3 focus area, providing useful and easily accessible information to researchers and technology experts, manufacturers that could produce the new technologies, enterprises that can apply them, planners and architects, and associations of enterprises and other relevant actors.

The activities undertaken in the field of Eco-Building under the ProEcoPolyNet project focused reviewed research projects and programme covering a large scope of existing technologies related to Eco-building (e.g. facade, glazing, components, lighting, etc.) with the aim to favour:

- market introduction of technical solutions for highly efficient office buildings (resp. other tertiary buildings) with a focus on decrease of cooling loads resp. efficient cooling approaches and,
- market introduction of low-energy single family houses (with a focus on prefabricated houses).

Based on the screening of research results applicable to both tertiary building and housing, ProEcoPolyNet have led actions aiming at informing architects and building owners on research results related innovative eco-building technologies. Several meeting have been held (national workshops, a web-based discussion forum and European events), creating a dialogue platform between architects, technology developers and manufactures. In addition, expertise services and technical audits have been provided to different office building projects, aiming at the introduction of up-to-date energy efficient technologies into these projects. An "Energy Efficiency and Renewable" guidebook for single family house has been prepared and published.

All these achievements and documents were presented in several fairs in the countries of participating partners and at European level. These efforts have supported the market introduction of results of European research related to innovative eco-building technologies through transfer into standard planning processes.

Susanna Schönauer, Austrian Energy Agency,
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Project website: http://www.proecopolynet.info

▷ RTD Screening

38 key projects for energy efficient and environmental-friendly building

Under the framework of the ProEcoPolyNet project, a crucial element for the project was to identify the most innovative and relevant ongoing research projects related to Eco-Building.

The partners involved in the Eco-Building activities of ProEcoPolyNet have carried out an extensive work of context-mapping, resulting in a list of more than 100 projects going on throughout Europe, classified in 5 main themes: Building Materials, Lighting, Passive houses, Renewables and Systems.

After careful screening and discussion, a total of 38 key projects were identified,

and compiled in a list that providing, for every project:

- The name and acronym of the project
- The type of RTD activity
- The main financial source of support for the project
- A detailed assessment of the project, including recommendations and follow-up
- The contact details of the project leader and the URL of the project (if appropriate)

The list of project has been the base on which the ProEcoPolyNet technology Profile have been elaborated.

From research on ventilation or solar air-conditioning to projects related to windows or low-energy technologies or on the concept and certification of passive house, this list is a one-stop shop for information on all the most innovative techniques, material and concepts related to Eco-Building in Europe. An essential tool, easily accessible for all from the ProEcoPolyNet website.

Download the RTD screening results list

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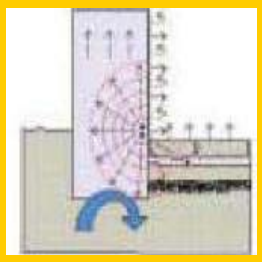
▷ ProEcoPolyNet Technology Profiles: An overview

Systems and Components



Non massive wall
© FAST

Wall temperisation

Referred to as wall temperisation, wall tempering, or wall warming, this technology is the modern equivalent to the one known from the Roman times as hypocaust heating. It is composed of one or two levels of soft copper pipes built in just bellow the inner wall surface, main pipes, connecting single heating loops, heat generator, safety appliances, and regulation. It represents an alternative system for heating of massive buildings with a direct low temperature heating of the walls instead of the indoor air

Marjana Sijanec Zavrl, Building and Civil Engineering Institute ZRMK; marjana.sijanec@gi-zrmk.si

See also:
ProEcoPolyNet "wall temperisation" technology profile

Improve your thermal insulation - Build "light"!

Non-massive structures have been developed to give an important contribution in controlling environmental internal conditions in buildings, offering to designers and architects the possibility to use different and lighter construction elements achieving actual energy saving. These elements consist of a layer structure composed of a cement board outside and gypsum plasterboards inside, with in-between layers of insulating materials depending on the conditions and objectives. Benefits of such systems include improved thermal insulation, more architectural flexibility, good control of summer cooling load and reduced weight of total structure.

Sergio Mammi, FAST-Federation of scientific and technical associations; fast@fast.mi.it

See also:
ProEcoPolyNet "non-massive structures" technology profile

Making use of Low-valued energies: Low Exergy Systems

Low exergy (or LowEx) systems are defined as heating or cooling systems that allow the use of low-valued energy (Energy with a very limited convertibility potential, notably delivered by sustainable energy sources, such as heat pumps, solar collectors, etc.) as the energy source. A wide application of Low-Ex heating and cooling systems in buildings will create a "flexible" building stock, able to adapt to use of sustainable energy sources when desired, and is therefore an essential step towards the development and extended use of sustainable energy sources.

Åsa Nystedt, Motiva, asa.nystedt@motiva.fi

See also:
ProEcoPolyNet "low-ex" technology profile *(mainly focusing on low temperature heating systems)*

Related website: Network of International Society for Low Exergy Systems in Buildings: http://www.lowex.net

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▷ ProEcoPolyNet Technology Profiles: An overview

Windows and Glazing

Windows diversity

Glazing and windows are one of the most important elements of the building envelope, be it regarding ventilation, heating or cooling insulation, visual interaction with the outside daylight, etc. Modern glazing and windows combine excellent thermal characteristics (thermal resistance, air-tightness) with still acceptable light transmission. Advanced technologies include highly energy efficient windows, solar protection glazing with high light transmission and thermal resistance (highly selective glazing), or changing of transmission characteristics via outside impulses (switchable glazing), all of which are presented in the ProEcoPolyNet technology profile on advanced glazing and windows.

Miha Tomsic, Building and Civil Engineering Institute ZRMK, miha.tomsic@gi-zrmk.si

See also:
ProEcoPolyNet "Advanced Glazing and Windows" technology profile

North - small / south - large?

A generally accepted way of building passive houses has been to have small windows facing north and large windows to the south. This is to minimize losses on the north side while gaining as much solar heat as possible on the south. Recently, Simulations were made on 20 terraced houses built outside Gothenburg in 2001, to investigate how decreasing the window size facing south and increasing the window size facing north in these low energy houses would influence the energy needs. The simulations showed that the size of the energy efficient windows does not have a major influence on the heating demand in the winter, but is relevant for the cooling need in summer, and hence that it is possible to enlarge the window area facing north and to get better lighting conditions

Åsa Nystedt, Motiva, asa.nystedt@motiva.fi

See also:
ProEcoPolyNet "Influence of windows size" technology profile:

Related publication: Mari-Louise Persson, Arne Roos and Maria Wall, Energy and Buildings, Volume 38, Issue 3 , March 2006, Pages 181-188

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▷ ProEcoPolyNet Technology Profiles: Focus

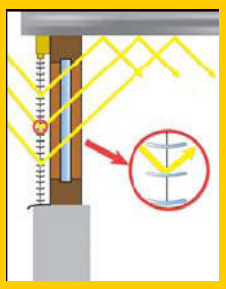
Facade: the potential of modern "double skin" technologies

Innovative facade concepts are today more relevant than ever. The demand for natural ventilation in commercial buildings is increasing due to growing environmental consciousness while at the same time energy consumption for buildings has to be reduced. An advanced facade should allow for a comfortable indoor climate, sound protection, good lighting and a minimum demand for auxiliary energy input. Double skin facades (DSF) have become a major architectural element in office buildings over the last 15 years.

The DSF is a system consisting of two single or double glazed skins with air flow in the intermediate cavity. The cavity's width may range from 10 to about 200 cm and be ventilated naturally, fan supported or mechanical. DSF can provide a thermal buffer zone, solar preheating of ventilation air, energy saving and possible reduction of air conditioning systems compared to single skin fully glazed facades, noise, wind, and pollutant protection for windows opening in the cavity, night cooling, protection of shading devices, efficient utilization of daylight redirection, space for energy gaining devices, such as, photovoltaic cells.

Commercial buildings with integrated DSF can be very energy efficient buildings with all the qualities listed above. However not all DSF built in the last years perform well. Far from it, in most cases large air conditioning systems have to compensate for summer overheating problems and the energy consumption badly exceeds the intended heating energy savings.

In general, potential problems caused by DSF may be overheating or high cooling



loads, condensation inside the cavity, sound and fire / smoke transmission from room to room especially in multi storey types, higher investment and maintenance costs compared to single glazed facades, the fact that the intermediate space of the GDSF in most countries is calculated into the total floor area of the building and therefore reduces the rentable space.

More recently the improved material and component properties and its possibilities to be incorporated in a complex construction increased the use of this type of façade which becomes a part of the buildings technology. A growing field of application is retrofitting or protection of existing façades by means of DSF.

The aim of ProEcoPolyNet is to inform architects and planners about the advantages and difficulties of DSF on the topic of the energy performance and indoor climate of the building. In the planning phase, architects and planners should also be aware about the potential problems and be informed in order to apply DSF in best possible way in the buildings. Relevant information can be found in the technology profile on the ProEcoPolyNet website.

Susanna Schönauer, Austrian Energy Agency, susanna.schoenauer@energyagency.at

See also:
ProEcoPolyNet "*Double glazed skin façade* "Technology profile, available in ***German*** and ***English***

ProEcoPolyNet "*Sun shading device*" Technology Profile

Related website: Intelligent Energy Europe "BestFacade" project: www.bestfacade.com

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▷ ProEcoPolyNet Technology Profiles: Focus

Advanced Solar Cladding Systems

As a result of research project involving consultants and the building company ("Trimo") in Slovenia, advanced solar cladding systems and elements for low energy buildings with energy active system are under development. Effective energy systems are developed on hot-air, hot-water and photovoltaic basis. They can be used for air and/or water heating system and low voltage electricity supply.

The central objective of this project is to improve energy efficiency of buildings with better heat transmission characteristics of elements, openings and connections. Whole system can be assembled from prefabricated modular elements suitable for all locations and building sizes. Implementation of the advanced solar cladding system in different climate conditions on global markets can be managed by specific control mechanism and software. Specific attention has also been devoted to wider application in reconstruction of older houses with low energy balance.

Trough applying different thin film photovoltaic modules on different elements several system solutions for roofs and façades were developed. Tests were carried out to determine, mainly, output of modules. The test results were used for the development of numerical algorithms for calculating output of several systems for roofs and façades and to calculate investments payback time, taking into account local conditions. These technologies can be adapted and optimised for each individual use, including micro location of building.

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Related website: http://www.trimo.si

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▷ Technical support activities

Development of an office building in Vienna

As part of the ProEcoPolyNet project, one of the partner, the Austrian Energy Agency, carried out technical support activities for an Austrian International project developer in the framework of a real estate project concerning: the construction of a building for office, catering and commercial purposes (total effective area: 13.000m²) in the city of Vienna.

The challenge was to ensure the energy supply of the building, as the power supply line could not supply the amount of energy originally planned for the building. The project developer decided to have a detailed look at the building in order to save energy demand and energy load. Furthermore, the project

developer wanted to implement other solutions such as using a combined heating and power plant at the building site. However, the project developer only contacted the Austrian Energy Agency at a quite late stage in the process, as most of the conceptual phase was already over and could not be modified.

The Austrian Energy Agency had several meetings with the project developer. Based on an energy simulation carried out by the Graz University of Technology, using the TRNSYS software, the Austrian Energy Agency provided information about several alternatives in order to decrease cooling load and consequently energy demand for cooling. The solutions proposed included, mainly:

- Integration of heat-absorbing glasses
- Downsizing of window area
- Reducing of internal heat loads
- Integration of shading systems

Due to the already advanced stage of development of the project, major elements like the façade could not be changed anymore. This illustrates the importance of integrating the energy-related aspects at a very early stage in the conceptual development of important real estate projects, in order to achieve optimal energy saving and energy efficiency measures.

Some of the proposals submitted by the Austrian Energy Agency were nonetheless accepted, leading to potential energy savings. However, the building developer had also to increase the potential of electricity load in order to make sure that the building would be equipped for all possible uses and installations, in order to suit all possible renters.

Finally, a few weeks after finalising the support, the contact person of in charge of the relations with the Austrian Energy Agency informed them that the building was sold before the construction phase was finalised. Thus, the project developers decided not to implement any energy saving measures that were planned as a result of the consulting activities, in order to save investment costs, and as running costs were not important any more for them.

This experience exemplifies the investor-user dilemma. The investor was not interested in building operation anymore and cancelled all energy saving measures. This investor-user dilemma is (still) a major obstacle in building energy efficient buildings. The other major lesson learned is that reduction of electricity or cooling load has to be part of an early planning stage in order to ensure the implementation in the detailed planning phase.

Susanna Schönauer, Austrian Energy Agency,
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▷ A Guidebook for Energy Efficient houses

Prepared under the ProEcoPolyNet project, by the Federazione delle Associazioni Scientifiche e Techniche (Federation of Scientific and Technical Associations - FAST), the guidebook "La casa energicamente Efficiente: Guida alla costruzione e alla gestione" (*The Energy Efficient House: a guidebook for building and maintenance*) presents 32 pages of information, advice and technologies to achieve maximal energy efficiency in private houses. Addressed to a large public, including technicians, professionals, public administrations, but also individual citizens, the guidebook addresses the issue from a full life-cycle point of view.

Starting with the conception and the building phases, it covers a wide range of aspects, including isolation, ventilation, lighting, hot/cold sanitary water etc. It also gives an overview of the best possibilities to integrate renewable energies into the house, and, in its final part, touch upon the issue of energy efficiency and renewable energy in existing houses, and the opportunities of retrofitting and renovation. The guidebook is only available in Italian and Finnish for the moment, but a version in English will be on-line shortly.

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Download the guidebook for Energy Efficient houses from the ProEcoPolyNet website

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