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IEE-project NorthPass: Promotion of the Very Low-Energy House Concept to the North European Building Market

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SUMMARY
The aim of the NorthPass project is increasing awareness and market acceptance of very low-energy houses in the North European construction market. This will be achieved by defining very low-energy house criteria and a concept for Northern Europe, finding solutions for removing market barriers in the wide market, removing the gap between demonstration projects and broad market penetration and supporting the implementation of the strategy and recommendations of the EU Commission. The project will increase the awareness and market acceptance of very low-energy house in the North European construction market, it will accelerate the identification of suitable solutions adapted to the cold climate environment and it will support the implementation of the EU Commission's recommendations regarding very low-energy buildings.

NorthPass Steering group members have answered a questionnary about following issues: current market situation of passive houses, specific challenges of passive houses, most important technological barriers on passive house markets, most important non-technological barriers on passive house markets, and needs and hopes for NorthPass-project. A summary of the answers is presented in the conference paper.

KEYWORDS
North Europe, very low-energy house, market penetration

INTRODUCTION
Passive house aims at minimising the energy demand of buildings in economically viable way and produce a good indoor climate in buildings. The heat loss of a passive house is so small that a normal heat distribution system will be unnecessary. The initial investment in a passive house may be higher than in a normal house, but the running and life cycle costs will be remarkably lower than in a normal house.

The level of thermal insulation in structures is better than in normal low-energy houses. The structures are designed and built without any thermal bridges that reduce performance of thermal insulation. The building's envelope is air-tight and the indoor climate is draught-free and evenly warm. The high yearly efficiency of ventilation heat recovery guarantees only minor heat losses in ventilation. The remaining small energy demand for heating can be covered using simple energy system solutions.

Different European research projects have focused on development of passive houses for different climate zones. Passive-on project [1] produced a preliminary definition for passive houses in Mediterranean area, i.e., cooling dominated countries. Promotion European Passive Houses - PEP [2] produced a preliminary definition for cold climates, This definition is now in use in Finland. Promotion of the Very Low-Energy House Concept to the North European

Building Market - NorthPass aims at further clarifying the minimum energy concept for cold climate applications.

NorthPass project is coordinated by VTT Technical Research Centre of Finland. Other partners are Tampere University of Technology from Finland, IVL Swedish Environmental Research Institute and Lund University from Sweden, SINTEF Building and Infrastructure from Norway, Aalborg University, Passivhus.dk Aps and CENERGIA from Denmark, University of Tartu from Estonia, Riga Technical University from Latvia, Vilnius Gediminas Technical University from Lithuania and National Energy Conservation Agency from Poland.

METHODS

NorthPass-project started 26.5.2009 and it will last until 25.5.2012. The aim of the project is increasing awareness and market acceptance of very low-energy houses in the North European construction market. This will be achieved by defining very low-energy house criteria and a concept for Northern Europe, finding solutions for removing market barriers in the wide market, removing the gap between demonstration projects and broad market penetration and supporting the implementation of the strategy and recommendations of the EU Commission.

Additionally, the project will suggest the reachable minimum performance requirement (kWh/m²) from the North European point of view and will help the participating Member States to define their national roadmap on very low-energy buildings.

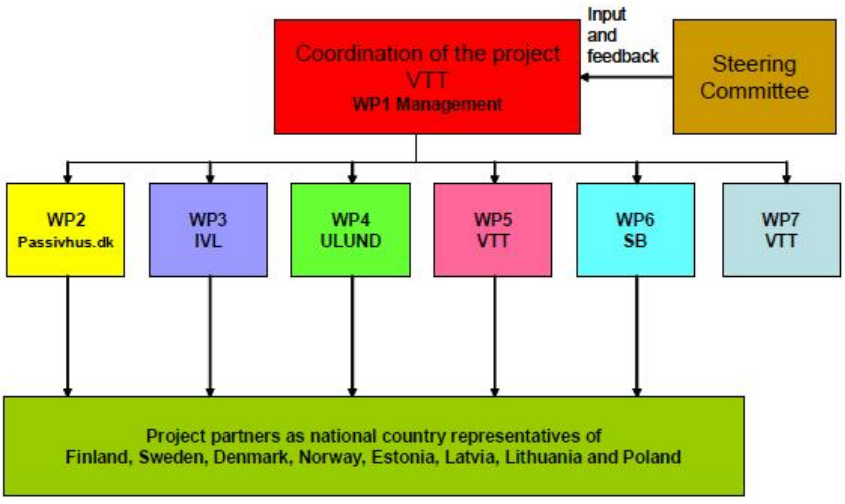

Figure 1. The organisational structure of NorthPass

Figure 1 shows the organisational structure of the project. WP2 “Definitions and concept buildings” creates a solution model for the very low-energy house definitions and concept buildings. WP3 “Impact and saving potential of North European very low-energy house” introduces the impact and saving potential of North European very low-energy house. WP4 “Overcoming barriers to implementation of very low-energy houses on the North European market” overcomes barriers to implementation of solutions in the North European market. WP5 “Market penetration of North European very low-energy house” utilizes the data produced in WPs 2, 3, 4 and connects this data to the information of the market demand. WP6 is the work package for communication and dissemination.

RESULTS

NorthPass web page

NorthPass web page [3] serves the target audience (producers, designers, authorities, building owners and builders) by providing information relevant to very low energy houses and their markets. The website provides clear information about the very low-energy house concepts promoted through this project and easy accessible downloads of all project publications, and furthermore relevant national links, Nordic co-operatives (e.g., Nordic Passive House Platform) and contacts. The website collects information on events of interest to people and stakeholder groups interested in very low-energy housing.

Delivered reports

NorthPass has so far delivered three reports: "Report on the application of the local criteria/standards and their differences for very low-energy and low energy houses in the participating countries", "A general description of the calculation tools for Cost Benefit Analysis and Life Cycle Assessment of very low-energy houses" and "Suggestions for the reachable minimum performance requirement to be utilized in the update process of the Energy Performance of Buildings Directive". All these reports can be uploaded on the project web page [3].

In "Report on the application of the local criteria/standards and their differences for very low-energy and low energy houses in the participating countries" the criteria and standards used in the participating countries were compared and their differences analysed. The comparison of the definitions was primarily qualitative and the purpose was to give a common context for the further work with the very low energy buildings and concepts in NorthPass. The very different requirements in the general building regulations as well as in various criteria for very low energy buildings can be seen as a challenge for a market driven penetration of very low energy houses in the Northern European countries.

The report "A general description of the calculation tools for Cost Benefit Analysis and Life Cycle Assessment of very low-energy houses" introduces the methodology of Life Cycle Cost Analysis (LCC), Life Cycle Assessment (LCA) and Cost-Benefit Analysis (CBA).

On 18 May 2010 a recast of The Energy Performance of Building Directive (EPBD) was adopted in order to clarify, strengthen and extend the scope of the Directive, and to reduce the large differences between Member states' practices in this sector. The recast prescribes that all new buildings must be nearly zero-energy buildings by 31 December 2020, that Member States should set intermediate targets for 2015, and that new buildings occupied and owned by public authorities have to be nearly zero-energy buildings after 31 December 2018. The NorthPass report "Suggestions for the reachable minimum performance requirement to be utilized in the update process of the Energy Performance of Buildings Directive" focuses on the transpose of EPBD into national legislation, presenting in brief some national plans and general recommendations regarding energy use in buildings.

Steering Group Questionnaire

NorthPass Steering group consists of 16 representatives of building professionals and building authorities from the participating countries. The steering group members were asked to answer a questionnaire about the current market situation of passive houses, specific challenges of passive houses, most important technological barriers on passive house markets,

most important non-technological barriers on passive house markets, and needs and hopes for NorthPass-project. The summaries of the answers are presented below.

Very low-energy house markets are emerging

All Scandinavian, Finnish and Baltic states have examples with very low-energy houses and the introduction phase is still going on. The existing financial market crisis may grow the gap between the markets of the Baltic states and strong EU countries.

Small countries have a small market of high energy efficient products and technologies. Without sufficient market demand the companies are not encouraged to provide high energy efficient technology solutions.

The introduction of total energy thinking and primary energy factors will promote the market penetration of very low-energy houses. In future the competition may make prices more reasonable.

Main technological barriers are quality of construction and installation, lack of solutions knowledge and lack of high energy efficient products and technologies

The quality of construction and installation is critical to airtightness. There is lack of solutions knowledge, e.g. solutions for thermal bridge optimized structures are missing. The effects of the Nordic climate are not clearly understood or recognized. The varying functional units (gross floor area, net floor area, treated floor area) cause missunderstanding. There is a low national availability of high performance components. Combining district heating and passive houses is also a challenge.

Main non-technological barriers are lack of knowledge, negative attitudes and conservative beliefs

There is lack of people with skills to design, construct, energy calculate and build passive houses. Programs of vocational training, high schools and universities are too old in some Baltic countries and they are not teaching modern passive solar architecture and engineering.

Different concepts and criteria cause confusion. Many construction professionals have conservative and denying attitudes against the introduction of rather radical changes in construction types compared to traditional ones, and the need for modern ventilation, windows and systems for air tightness. Construction professionals often do not understand the resources of passive solar architecture and other free energy sources. There is need for competent energy consultants with experience in cost optimizing with a total energy approach.

Thick insulation is considered as a problem, and there is fear of building physical problems in the house. People tend not to believe that indoor conditions are better in a well insulated, airtight house.

The steering group hopes for a fruitful co-operation between project partners, useful tools and guides about very low-energy houses

The project partners are expected to exhange information about the best practices in their countries, share experience and knowledge, and to find a consensus among the countries. The

expected results are: improved understanding of the subject in the North-European countries, North-European concepts for very low-energy houses, and guides for creating very low-energy houses e.g. comprehensive descriptions of very low-energy house architecture, technology and indoor climate, life cycle analyses and recommendations for maximum cost effectiveness. The results should be disseminated effectively, and people should be educated about the benefits of very low-energy houses.

DISCUSSION AND CONCLUSIONS

The answers to the questionnaire for the building professionals of NorthPass Steering Group clearly show the need for a North-European approach for very low-energy house concepts and criteria. Solutions are needed to remove both technological and non-technological market barriers. Because of a lack of knowledge in the field of low-energy construction the need for reliable information is acute.

ACKNOWLEDGEMENT

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