



Research on Zero Energy Buildings

Information collected by the REHVA Journal

- The list will continue in the next issue of the REHVA Journal
- please send your contribution to oseppanen@rehva.eu by Nov 7th.

Nearly zero-energy buildings are required by the Energy Performance Buildings Directive (2010). Article 9 states that Member States shall ensure that after the end of 2020, all new buildings are nearly zero-energy buildings; and after the end of 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings. Member States shall draw up national plans for increasing the number of nearly zero-energy buildings. These national plans may include targets differentiated according to the category of building. Member States shall furthermore, following the leading example of the public sector, develop policies and take measures such as the setting of targets in order to stimulate the transformation of buildings that are refurbished into nearly zero-energy buildings. This requirement has created lot of activities in research and development in Europe. The trend towards zero energy building is worldwide. REHVA Journal has collected some information of the research units which are specially focusing on zero energy buildings.

Denmark

Aalborg University, Strategic Research Centre on Zero Energy Buildings, Division of Architectural Engineering

*Head of the Centre: Professor **Per Heiselberg**, Department of Civil Engineering, AAU.*

Strategic Research Centre on Zero Energy Buildings was in 2009 established at Aalborg University by a grant from the Danish Council for Strategic Research (DSF), the Programme Commission for Sustainable Energy and Environment, and in cooperation with the Technical University of Denmark, Danish Technological Institute, Danfoss A/S, Velux A/S, Saint Gobain Isover A/S, and The Danish Construction Association, the section of aluminium facades.

http://vbn.aau.dk/en/organisations/pp_2a8bd494-da4e-45c8-ac41-55be0499d012.html

European Commission

Project 2012-13: Towards nearly zero-energy buildings - Definition of common principles under the EPBD

Project partners: Ecofys, Politecnico di Milano, University of Wuppertal, nzeb@ecofys.com

Estonia

Tallinn University of Technology, Nearly Zero Energy nZEB Research Group, Faculty of Civil Engineering

*Head of the nZEB research group: Professor **Jarek Kurnitski***

Nearly Zero Energy nZEB Research Group was established in 2012 at Tallinn University of Technology by a grant from the Estonian Science Foundation, with a support of the European Social Fund (ESF), the researcher mobility programme Mobilitas. This grant provides a funding for the period of 01.04.2012 – 31.07.2015. Research is focused on technical solutions for nZEB most urgently needed in Estonia. These include new heating and ventilation solutions suitable for specific operation conditions in nZEB, new external wall assembly solutions studied with computational analyses and climate chamber tests. Office building solar shading and façade analyses will use energy simulations and measurements at TUT technological facility. Energy simulations are combined with economic and cost optimal analyses. This multi- and interdisciplinary nZEB research group represents a strong networking effort within TUT among four different disciplines: Energy performance of buildings, Building Service Systems, Building Physics and Construction Economics and Management.

<http://www.tut.ee/faculty-of-civil-engineering/faculty-of-civil-engineering-1/>

Finland

Aalto University, Department of Energy Technology, Research Group for Building Energy Efficiency and HVAC-technology

Head of Research Group: Professor Kai Sirén

Aalto Research Group (former Helsinki University of Technology) has been focusing on building energy efficiency related questions for more than thirty years. Current research focus areas are in the development of system solutions for low-energy and NZEB buildings, cost optimality, local energy production, PV mismatch problem, integration of production with HVAC-systems, micro co-generation, energy storage and community level solutions. The principal methodology is building energy simulation combined with different kinds of optimisation algorithms, mainly GA. Research support in the NZEB area comes from a large national 4 years research programme, a 5 years Fellow grant from the Academy of Finland as well as from Aalto University itself.

<http://ene.aalto.fi/en/>

Germany

Fraunhofer Institute of Building Physics (Fraunhofer IPB) Energy Concepts, Department Heat Technology

Group Leader: Dr Heike Erhorn-Kluttig

More than 40 % of energy consumption in Germany and Europe is caused by buildings. Innovations in current construction and systems engineering allow for building concepts to be realized that feature a nearly-zero energy demand, and that may even produce an energy surplus. The buildings of the future could become micro power plants. As this trend evolves, special attention should be paid to the building conglomerations in urban settlements and city sectors, in order to facilitate an economically feasible utilization of surpluses in heating, cold and power. The working group develops, supervises and evaluates energy concepts for high-efficiency individual buildings and settlements by private and public developers, prefabricated building manufacturers, systems manufacturers and energy providers. In collaboration with architects and possibly with other parties involved in planning, the working group conceives energy concepts for trend-setting buildings, in both residential and non-residential sectors.

Fraunhofer IBP is participating the plus energy house programme of the German Ministry of Transport, Building and Urban Development. Within the programme several buildings are evaluated, see more at <http://www.bmvbs.de/DE/EffizienzhausPlus/Monitoring/node.html>, <http://www.ibp.fraunhofer.de/en/Expertise/heat-technology/energy-concepts/>

University of Wuppertal

Prof. Karsten Voss (kvoss@uni-wuppertal.de). Subtask leader of the IEA SHC Task on net zero energy buildings.

University of Darmstadt

Prof. Manfred Hegger (hegger@ee.tu-darmstadt.de). Designer with students of two German cases of plus energy houses. Winner of the Solar Decathlons in Washington.

University of Stuttgart

Institute for Building Energetics. Prof. Dr.-Ing. Michael Schmidt. Focusing on HVAC for nZEBs and performance testing. info@ige.uni-stuttgart.de

University of Stuttgart

Prof. Werner Sobek (stuttgart@wernersobek.com). Architect of the plus energy house in Berlin.

Technische Universität Braunschweig

Institut für Gebäude- und Solartechnik. Univ.-Prof. Dr.-Ing. M. Norbert Fisch.

Norway

The Research Centre on Zero Emission Buildings – ZEB

Director: Anne Grete Hestnes, annegrete.hestnes@ntnu.no

In February 2009, the Research Council of Norway assigned The Faculty of Architecture and Fine Art at the Norwegian University of Science and Technology to host the Research Centre on Zero Emission Buildings (ZEB), which is one of eight new national Centres for Environment-friendly Energy Research (FME). The main objective of the FME-centres is to contribute to the development of good technologies for environmentally friendly energy and to raise the level of Norwegian expertise in this area. In addition, they should help to generate new industrial activity and new jobs. The centres have been selected primarily on the basis of the scientific merit of their research, and their potential to reduce greenhouse gas emissions and to generate innovation and value creation. The Research Council of Norway has been responsible for selection. Over the next eight years, the FME-Centre ZEB will develop competitive products and solutions for existing and new buildings that will lead to market penetration of zero emission buildings related to their production, operation and demolition. Partners: NTNU, SINTEF, Skanska, Weber (Maxit), Isola Glava, Protan, Hydro Aluminium, YIT, ByBo, Multiconsult, Brødrene Dahl, Snøhetta, Forsvarsbygg, Statsbygg, Husbanken, BNL, Norsk Teknologi, BE, DuPont, Velux AS, Glen Dimplex Nordic AS.

<http://www.sintef.no/Projectweb/ZEB/About-ZEB/>

Switzerland

Novatlantis, 2000-Watt-Gesellschaft

Executive Director: Roland Stulz

Novatlantis takes the findings and results of recent research within the ETH domain and applies them to projects designed to promote sustainable development in major urban settlements. By using practical examples, we seek to demonstrate what a sustainable future might be like. Working with researchers and scientists from the ETH domain, we initiate multidisciplinary projects. In partnership with governmental bodies and industry, we run projects which reflect the societal and technical aspects of sustainability. Projects are forward-looking, cost-effective and environmentally-friendly and seek to ensure that future generations can enjoy a high quality of life. The use of the latest technology will guarantee high living standards. Economic prosperity for all will guarantee material and spiritual development. A considerate use of resources and closed material cycles will guarantee environmental integrity. Our vision is long term and our current horizon is 2050.

<http://www.novatlantis.ch/en/2000watt.html>

USA

The Zero Energy Buildings Database, the U.S. Department of Energy

The Zero Energy Buildings Database features profiles of commercial buildings that produce as much energy as they use over the course of a year. This database highlights projects from across the country and provides ideas that can be applied to any new building.

The Zero Energy Buildings Database is part of the High Performance Buildings Database which lists many additional projects. Visit also the High Performance Buildings Database to discover more energy efficient building techniques. To find out more about the zero energy buildings, simply click the name of a project to view in-depth information about the design and construction process,

financing, energy use, materials, indoor environment, and more.
<http://zeb.buildinggreen.com/>

Towards nearly zero-energy buildings
Definition of common principles under the EPBD
Stakeholder workshop
Ecofys | Politecnico di Milano | University of Wuppertal

