

REHVA organised seminar: HVAC for Net Zero Energy Buildings at ISH Frankfurt March 17, 2011

SUMMARY BY JAREK KURNITSKI



REHVA seminar HVAC for Net Zero Energy Buildings (nZEB) at ISH Frankfurt March 17, 2011 showed great interest in nZEB-theme. About 150 participants were much more than expected and the room was too small to accommodate all interested visitors. In addition to HVAC experts, we were pleased to see in the seminar many representatives from real estate and construction sector as well as many young participants – deserving a special mentioning, and also REHVA experts.

Highlights of the presentations

Jarek Kurnitski, SITRA: Energy boundaries and scientific definition of nZEB based on the results of REHVA Task Force

Jarek Kurnitski, the chair of the REHVA Task Force “Nearly Zero Energy Buildings” nZEB reported the ongoing work of nZEB definition preparation. See article on page 6 about REHVA proposal for nZEB technical definition and boundaries which will help Member States in defining the nearly zero energy buildings in a uniform way.

REHVA Task Force “Nearly Zero Energy Buildings” nZEB proposed definitions

nZEB has exact performance level of 0 kWh/(m² a) primary energy use

net zero energy building (nZEB) energy use of 0 kWh/(m² a) primary energy

NOTE 1 A nZEB is typically a grid connected building with very high energy performance. nZEB balances its primary energy use so that the primary energy feed-in to the grid or other energy network equals to the primary energy delivered to nZEB from energy networks. Annual balance of 0 kWh/(m² a) primary energy use typically leads to the situation where significant amount of the on-site energy generation will be exchanged with the grid. Therefore a nZEB produces energy when conditions are suitable, and uses delivered energy during rest of the time.

nearly net zero energy building (nnZEB) national cost optimal energy use of > 0 kWh/(m² a) primary energy

NOTE 1 The Commission shall establish by 30 June 2011 a comparative methodology framework for calculation of cost-optimal levels (EPBD recast).

nnZEB depends on national conditions

The presentations can be downloaded from the REHVA home page in news section: <http://www.rehva.eu/>



Risto Kosonen, Halton Group:
Indoor air quality and climate considerations in nZEB

Risto Kosonen discussed in his presentation the meaning of good IAQ and thermal comfort on well being, productivity and health. Economic calculations easily prove that indoor climate cannot be compromised for saving energy. This can lead to enormous losses for companies or organizations occupying the buildings. From the technical point of view there is not necessarily any conflict between energy performance and indoor climate requirements, because many technical solutions exist enabling to satisfy most tight requirements and making it possible to improve indoor climate and energy performance simultaneously.

Wellbeing and health of people

Environment friendly

Life time cost effective

Sustainable Indoor Environment

IAQ in ZEB

RISTO KOSONEN, HALTON GROUP

- ▶ EN 15251:2007 is a good tool to control all important indoor climate parameters. It can be concluded that tightening of energy performance requirements provide good opportunity for advanced ventilation and room conditioning systems leading to win-win-win situation for owners in terms of less complaints and energy savings, for occupants as improved comfort and for manufacturers as more advanced system solution with improved performance.

Sustainable Living Environment

Energy
 Energy Performance Class: A
 Energy consumption: 325 kWh/m²/yr
 Energy label: A

ENVIRONMENT
 Use of energy and other resources

VS

WELLBEING:
 Healthy, productive, comfortable indoor environment

IAQ in ZEB

RISTO KOSONEN, HALTON GROUP

**Olli Seppänen, REHVA:
 News from the European Commission**

Olli Seppänen introduced two important policy plans adopted by the European Council: A roadmap for moving to a competitive low carbon economy in 2050 and a new Energy Efficiency Plan 2011. The roadmap reports that EU is on good track to reduce greenhouse gas emissions by 20% due 2020. New milestones, -40% for 2030 and -80% for 2050 are set and considered as cost effective. Both of these refer to domestic (not incl. offsetting) reductions compared to 1990. These targets are also broken down for key sectors. In the energy efficiency, the progress is less good, because only half of the 20% objective of the primary energy reduction is estimated by Commission with current policies. Energy Efficiency Plan 2011 has to be fully implemented to get on track to achieve this target.

The buildings are still the greatest potential and the implementation of EPBD, Ecodesign and RES directives will have major importance. Legally binding national targets for 2020 and legal instruments under whose provisions public authorities will be required to refurbish at least 3% of their buildings by floor area each year – about twice the currently prevailing rate, as well as promotion systems for private sector buildings are some new instruments discussed in Energy efficiency action plan.

EU has provided not only directives but also a large amount of guidance possible to utilize in various levels. A web portal BUILD UP is a good example of an open platform to disseminate energy efficiency related information.

See: www.buildup.eu

Important energy related directives in the European Commission

- Building performance – EPBD – 2002, Recast 2010**
 Improvement of energy performance of buildings
- End use efficiency and energy services -ESD**
 Member States to save at least an additional 1% of their final energy consumption each year for the 9 years- second set of intermediate reports due in June 2011
- Energy using products – EuP 2005 → Energy related product ErP 2009**
 Aim at protecting the environment and securing energy supply
- Renewable energies – April 2009**
 Increase the use of renewables up to 20%, bio fuels up to 10%

Important HVAC related product groups – status in the beginning of 2011

- **ENER LOT 1 Boilers (including heat pumps)** Study completed in 2008. Voting in Regulatory Committee is expected in 2011.
- **ENER LOT 2 Water Heaters** The study has been done much in parallel with ENTR LOT 1
- **ENER LOT 11 (electrical motors, circulators, pumps and fans) For circulators and motors** Implementing measures have been published and regulations have entered into force.
- **ENER LOT 15 Solid Fuel Small Combustion Installations** is actually the first study dealing with products which may work without electrical power.
- **ENER LOT 20 Local room heating products** and **ENER LOT 21 Central heating products**
- **ENTR LOT 1- Refrigerating and Freezing Equipment** Final stakeholder meeting to be held in October 2010, final report to be published in November 2010.
- **ENTR LOT 6 - Air conditioning and ventilation systems** ("Final" report expected in September 2011); ENTR Lot 6 will cover ventilation products not already covered by ENER Lot 10.

Solutions for different audiences

The market
 Public authorities
 Building professionals
 Building occupants

BUILD UP
 Web portal

Energy legislation
 EPBD implementation
 National info in practice
 You and the EU

Energy efficiency
 Databases of Cases, Tools, Publications
 Your guide to energy efficiency

REHVA
 Federation of European Heating, Ventilation and Air-conditioning Associations

BUILD UP
 energy solutions for better buildings

OLLI SEPPÄNEN, REHVA

Ansgar Thiemann, Daikin Europe: Half year experience from Net Zero Energy Office Building

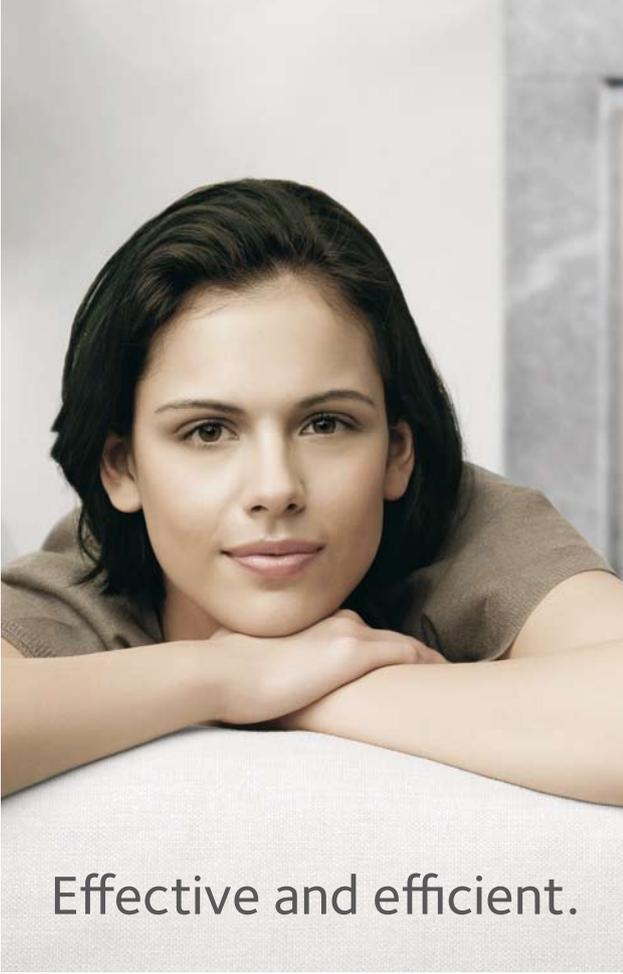
Ansgar Thiemann introduced technical solutions and results from nZEB office building. The concept is based on combined Daikin Altherma - VRV heat pumps for heating and cooling and VAM heat recovery ventilation supported by photovoltaic power generation.

Technical Concept

Heating	Daikin Altherma – Air to Water heat pump with floor heating
	VRV – Air to Air heat pump used for heating
Cooling	VRV – Air to Air heat pump Cooling + dehumidification in summer
Ventilation	Daikin Altherma VAM – heat recovery ventilation Sensible and latent heat recovery
Lighting	Use of LED-technology for night-lighting and spot-lighting
Power generation	Thin film Photovoltaic with 27,3 kWp
Energy-monitoring	Building management system



Net-Zero-Energy-Building Test Office | DAIKIN Europe N.V., Zeller Kälte- und Klimatechnik GmbH and Athika GmbH

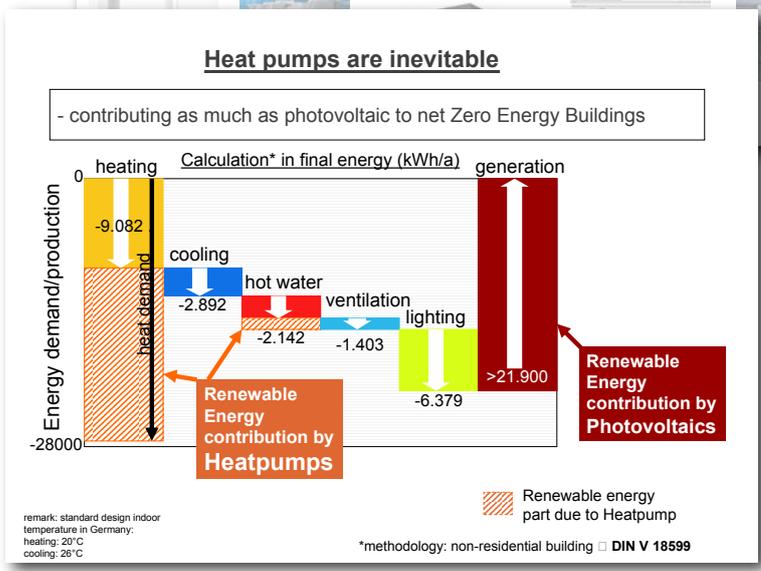


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Read more: www.tulikivi.com



The building is net zero energy building according to calculation with EnEV, but some differences are recorded in reality, suspected to be caused by the limitations of the calculation method. This shows that nZEB requires good calculation methodology, i.e. dynamic simulation, in order to reach net zero energy level in practice.

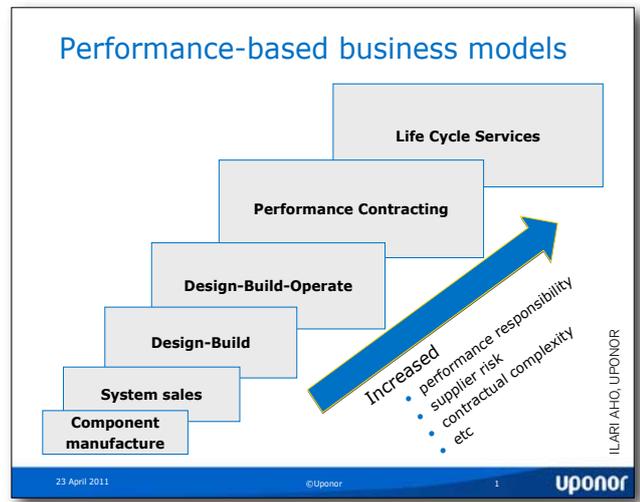
The project is on good track; the main challenge is that all advanced solutions applied are not yet economically feasible. This applies especially for power generation, as heating, ventilation and cooling solutions are mainly with reasonable payback.

ANSGAR THIEMANN, DAIKIN EUROPE

Ilari Aho, Uponor:
Heating and cooling business challenges in nZEBs

Ilari Aho raised an important aspect for HVAC industry in nZEB construction process. Subcontractor can deliver only the installation of the technical system, not a performance of the building. nZEB creates challenge for all construction, contracting and manufacturing chain. It is not evident, how nZEB performance can be delivered with existing business models where the focus has been rather in installed components not in performance of the systems and building.

Not only careful commissioning, but utilization of performance based business models are needed to guarantee nZEB operation



in practice. For that purpose, development of common, measurable and contractually applicable performance metrics is needed.

Timo Schreck, Enventus AB:
Energy efficient ventilation with heat recovery

Timo Schreck introduced sorption technology used in energy recovery rotors still too rarely used in Europe. Sorption rotors provide savings in cooling capacity demand in air handling unit. The savings in cooling capacity investments exceeds the additional costs of sorption treatment making the use of sorption technology highly profitable.

In mild and cold climate, humidity transfer of sorption rotors is beneficial due to cooling capacity savings. The savings in cooling energy are less important due to relatively short cooling period.

Advantages of sorption technology

- 20-40% lower cooling capacity need for AHU's
- Energy saving in the summer time
- Energy and capacity saving when humidification is needed
- Better air quality (higher humidity) in winter time

The slide includes an image of a sorption rotor unit and a diagram showing the process of humidity transfer. The Enventus Energy Recovery logo is at the top left.

Erick Melquiond, Eurovent Certification:
Certified products are needed for Net Zero Energy Buildings

Erick Melquiond provided an overview of a third party certification principle like Eurovent Certification Company. It is important to distinguish efficiency labels and certified

Conclusion :

- 1) Look for a third party logo
- 2) Check validity on line

The slide features the Eurovent Certification logo and an image of an energy efficiency label for air handling units. The label shows a scale from A (green) to G (red) and includes the text 'ENERG EFFICIENCY CLASS'.

Certification programmes

The slide lists various HVAC products under the Eurovent Certification logo:

- Air Conditioners
- Fan Coils
- Filters
- Chilled Beams
- Refrigerated Display Cabinets
- Air Condensers
- Heat Pumps
- Liquid Chilled Packages
- Air Evaporators
- Air Handling Units
- Rooftops
- Energy Recuperation Systems
- Cooling Towers
- Drift Eliminators

PERFORMANCE CERTIFICATION HVAC PRODUCTS FOR NETZERO BUILDING 17th March 2011 2

efficiency labels. A third party logo and on line check will prove the product performance most effectively. CERTIFLASH downloadable at www.certiflash.com is very convenient to easily google-ized certified performance of more than 50 000 products.