# 3rd Newsletter

August 2013

## MEETINGS

### Copenhagen Meeting

The 4th meeting of the working phase of Annex 56 took place in Copenhagen, Denmark, on March 18th, 19th and 20th 2013

The 26 participants from 10 countries, were informed about the recent developments particularly regarding the achieved results in subtask A — methodology and subtask C — Case studies. Regarding subtask A, some first results were presented after the definition of the methodology to be used for Annex 56.

Subtask C presented the detailed case studies and the shining examples already identified; the latter being a priority towards the online publication of a brochure at the end of the current year.

There was also the opportunity to visit some energy renovated buildings, in particular to Traneparken and Sems Have, Roskilde .

More information about the subtask results can be found in the pages.

## GRAZ INDUSTRY WORKSHOP

The aim of the public Workshop is to introduce the audience to the essential tasks in the individual projects of Annex 56 and Annex 57, as well as to obtain input from external experts for further research activities out of the discussions and practice. The importance of a cost effective renovation strategy and the accelerated market entry of nZEB will be presented and discussed.

**Which target groups are interested?**

Policy makers | Owners/investors | Municipalities | Technicians and building professionals | People from practice (and research) → executive firms

## GRAZ Industry Workshop

**Important Dates**

Annex 56 expert meeting: September 23rd – 25th 2013

**Annex 56 Industry Workshop: September 25th 2013**

Graz SB13 Conference: September 26th – 28th 2013

**Location**

Assembly Hall, Graz University of Technology

A-8010 Graz, Rechbauerstraße - Austria

**Program**

**Part 1:** General

- Two statements on the current state regarding cost effective building renovation
- Mag. Krainer (MD ÖWG) – (inquired)
- 2nd speaker: N.N

**Part 2:** Short presentations of the research projects (IEA EBC Annex 56, IEA EBC Annex 57 and AIDA)

- IEA EBC Annex 56: Roman Bolliger – "Cost optimal and cost effective results from parametric studies in generic buildings"
- IEA EBC Annex 56: Julia Maydl – „Case Studies"
- IEA EBC Annex 57: Tatsuo Oka
- EU project AIDA: Raphael Bointner – „nZEBs in municipal practice: Chances and Challenges"

Following both parts presentations, a panel discussion with the speakers and invited guests (policy makers, planners and owners) will take place.

The spoken language will be English.

**Organisation**

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**More information at**

www.iea-annex56.org | www.sb13.org

www.aee-intec.at

# IEA EBC INDUSTRY WORKSHOP

**Graz, Austria, 25th September 2013, 14:00-18:00**

In cooperation with IEA EBC Annex 57 and AIDA

**The Industry Workshop of the IEA EBC Annex 56 will take place in Graz, at the Graz University of Technology, following the 5th meeting of the project and just before the SB13 Graz Conference.**

The next Annex 56 meeting will be held within the frame of the SB13 Conference in September 2013. In the course of the meeting, an "Industry Workshop" will be arranged taking place in cooperation with the IEA EBC Annex 57 (Evaluation of Embodied Energy & Carbon Dioxide Emissions for Building Construction) and the EU project AIDA (**A**ffirmative **I**ntegrated Energy **D**esign **A**ction).

In the future at least 2/3 of the upcoming construction activities will be renovation works. This is an opportunity to renovate buildings not only barely but thinking about long-term cost effective renovation opportunities and exploit the potential of the existing building stock for the reduction of energy consumption and carbon emissions.

IEA EBC Annex 56
Cost-effective energy and carbon emission optimization in building renovation

***www.iea-annex56.org***

The aim of the research project **Annex 56** is to develop a methodology to evaluate and analyse cost effective building renovations which optimise energy consumption and carbon emissions reduction. Similarly, the development of the necessary tools and instruments to support decision makers is another research focus. The methodology will be developed and applied for testing on case studies, which are characterized including energy conservation and efficiency measures as well as measures for the use of on-site harvested renewable energy. The resulting, quantitatively elusive co-benefits, should also be demonstrated as well as the relevance of including a life cycle impact assessment in the evaluation of renovation measures.

AIDA
AFFIRMATIVE INTEGRATED ENERGY DESIGN ACTION
www.aidaproject.eu

***www.aidaproject.eu***

The **AIDA** project aims to accelerate the market entry of nearly zero-energy buildings (nZEB). This means energy efficient buildings and the use of renewable energy sources, which are both highlighted in the IEE2011 work program. Currently there is a lack of intense actions to spread knowledge about nZEB. It is evident that citizens will be better prepared and more willing to adopt nZEB if their municipality sets an example thus giving them direct access to and experience of nZEB. Raising awareness towards nZEB among local authorities and building planners becomes a key factor. AIDA offers action tailored to suit each of these groups including study tours, operational success stories, presentation of existing tools, active support of municipalities and close cooperation with key actors.

57 Annex 57

***www.annex57.org***

The IEA EBC Annex 57 focuses on "Evaluation of Embodied Energy and Carbon Dioxide Emissions for Building Construction". The state of the art for embodied energy and CO2 emissions due to building construction as well as results from existing research projects are being analyzed and summarized. As embodied energy/carbon dioxide occupies large part of the whole energy consumption and carbon dioxide emissions especially in the countries where the building construction activity is enormous, need for evaluation of them with scientific basis is increasing among building designer, developers, building material manufacturers and policy decision makers in many countries.

More important issue than the evaluation is how to decrease embodied energy/carbon dioxide in practice in building construction field. As there is a large potential to decrease the embodied energy/ carbon dioxide due to the building

## SUBTASK A—ANNEX 56 METHODOLOGY

The overall objective of Annex 56 is to develop a methodology which is able to serve as a basis for future standards which enable cost effective renovation of existing buildings while optimizing energy consumption and carbon emissions reduction to achieve nearly zero emission buildings which are also nearly zero energy buildings after renovation. The requirement of cost effectiveness and the exploration of synergies and trade-offs between energy efficiency measures and measures based on renewable energy use and production, are questions of special interest.

Methodology and resulting fundamentals for renovation standards are supposed to be applicable to different climatic and country specific situations as well as driving building renovation cost effectively towards nearly zero emission buildings which are also nearly zero energy buildings.

In doing so the methodology assumes a broader approach going beyond cost effective reduction of carbon emissions and energy consumption by taking into account the overall added value achieved in a renovation process. This means identifying global quality improvement, economic impact of the intervention, operating costs reductions, resulting co-benefits like comfort improvement (thermal, natural lighting, indoor air quality, acoustics, etc.), fewer problems related to building physics and fewer negative external effects of the building (air pollution). Furthermore, the methodology takes into account embodied energy and associated carbon emissions.

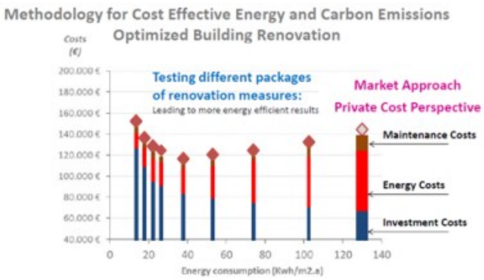
Thereby it shall be possible to assume a societal (macro) economic perspective as well as an individual end-user or investor perspective (financial).

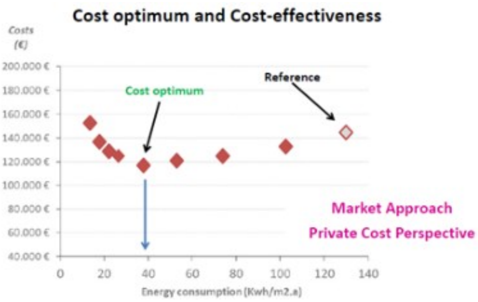
Methodology is developed for the assessment of the impacts of renovation measures on energy use and carbon emissions as well as on the costs incurred for residential buildings and simple office buildings without complex HVAC appliances.

While the basic assessment methodology is supposed to apply to all residential buildings, specific target values will have to be specified for different categories of residential buildings (at least for single family houses and multi-family houses) and are depending on the specific climate or country context of the respective buildings. For the recast of EPBD, BPIE (Nov. 2011) takes into consideration two different approaches defining standards and target benchmarks, either with or without allowing for building geometry. In the case of building renovation, building geometry is usually more or less determined. Therefore it is appropriate to consider building geometry in defining standards for building renovation.

To support the methodology and help developing it, a set of generic buildings based on the prevailing typologies and constructive solutions in each country has been selected. This was possible due to the wide scope of countries participating in the project.

Parametric studies are being performed on those buildings and the results from different renovation packages are being compared, in order to understand the changes that country-based costs (including energy) have on the final results.




For residential buildings and simple office buildings the following components of energy consumption and related carbon emissions are considered:

- Heating, cooling, ventilation (HVAC) and domestic hot water (DHW)
- Lighting and energy consumption of building equipment (built in appliances and auxiliary energy use for heating and DHW)
- Primary energy use for building materials, equipment and appliances (embodied energy use): This share of primary energy use in the building sector is increasing due to the supposed decrease of energy needs for HVAC and DHW. For the sake of a comprehensive assessment it is preferable to include embodied energy use into analyses, even if in the case of building renovation embodied energy use is less relevant than in the case of new building construction.

## SUBTASK C — CASE STUDIES

The work of this subtask is to identify and select some realized, on going or intended renovation projects that can provide significant feedback from success-stories in reality and experiences and lessons learned from practice.

The presentation of these cases will help relevant players of the renovation process, to clearly understand the advantages of acting in the energy related components of the building, such as building envelope or building systems and equipments.

Two different categories were defined for these case studies — the detailed case studies and the shining examples. When the task is concluded, both categories will be available online (www.iea-annex56.org), and by the end of 2013 an electronic publication with the shining examples will be available for download.

All participating countries were asked to provide different case studies in both categories and to identify which of them could be used as shinning or detailed case studies.

## SHINING EXAMPLE — TRANEPARKEN, HVALSØ, DENMARK

### Project summary

The buildings had to be renovated because they were worn down.

The overall intentions were to:

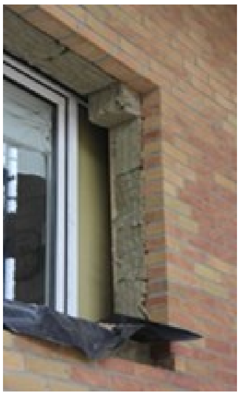
- Renovate buildings because needed – especially the concrete external walls
- Improve energy conditions (insulation – windows – doors)
- Improve indoor climate
- Improve flats by adding an external balcony
- Improve the outdoor areas

| | |
|---|---|
| **Site:** | Traneparken 2-20<br>4330 Hvalsø, Denmark |
| **Altitude:** | 47 m |
| **Heating degree days:** | 2906 |
| **Cooling degree days:** | 0 |
| **Owner:** | Hvalsø Boligselskab |
| **Architect:** | ARKIPLUS 1969 |
| **Engineer:** | Sigfried Lorentzen<br>Rådgivende Ingeniørfirma |

### Building description /typology

- 3 blocks of prefabricated concrete sandwich element buildings
- Built: 1969
- Energy label: E
- Gross heated floor area: 5293 sqm

**Important dates:**
Start of the renovation: November 1, 2011.
End of the renovation: October 1, 2012



### Energy renovation features

**Building**

- The exterior walls have been renovated: Supplementary thermal insulation has been added to the outside of the exterior walls. The external insulation is continued to the base of the building to reduce any thermal bridges. Cost: 1.7 million € (incl. VAT)
- The roofs have been renovated and insulated. Cost: 550.000 € (incl. VAT)
- The windows and doors have been replaced with 3 layers low-energy windows. Cost: 115.000 € (incl. VAT, excl. installation).

**Heating system**

Nothing changed

**Ventilation system**

The flats are now ventilated by a balanced mechanical ventilation system with heat recovery. Exhaust air from bathroom, toilets and kitchens and supply air to the living rooms

**Lighting**

No changes of the lighting - it is already up to date

**Renewable energy systems**

Solar panels are installed for electricity production

| Element (only block A) | Area, $m^2$ | U-value before renovation | U-value after renovation | after renovation |
|---|---|---|---|---|
| Exterior walls | 486 | 0.66 | 0.15 | Plus 190 mm insulation plus exterior solid standard bricks<br>Now: 240 mm |
| Filling | 106 | 0,7 | 0,11 | Plus 285 mm insulation plus exterior solid standard bricks<br>Now: 330 mm |
| Windows, doors | 205 (176 m2 ifølge ingeniør) | 1.8 | 0.8 | 3-layer low-energy windows with alu – wood frame |
| Roof | 333 | 0,2 | 0.09 | Plus 250 mm<br>Now: 435 mm |

**Energy**

Savings: 226 MWh/year.

PV production: 30 MWh/year

**Indoor climate technical improvements**

The indoor climate was improved due to:

- mechanical balanced ventilation with heat recovery and a carefully adjusted supply temperature
- Less heat loss and draught through walls, windows and doors

**Economics**

It was important for the economy that the buildings needed renovation because of beginning deterioration. Therefore a large part of the renovation could be financed from funding available for improving the present situation – a Danish fund for social housing was used for this purpose: "Landsbyggefonden".

**Decision process – barriers that were overcome**

In this kind of dwellings the majority of the residents has to agree on the decision. This means a lot of information, many meetings etc.

Practical experiences of interest for a broader audience

**Non-energy benefits**

- New balconies
- New green surroundings
- Ventilation – better indoor climate

**Economic consequences for the tenants**

Rent before: 93 €/m²/year

Rent after: 105 €/m²/year

Increase: 12 €/m²/year

Energy savings: 226 MWh/year

Energy price: 94 €/MWh

Savings: 226 x94 = 21.244 €

**4 €/m²/year**

| Craftsmen | 5 million € | 1000 €/m² |
|---|---|---|
| Consultants | 1.5 million € | 300 €/m² |
| Total | 6.5 million € | 1300 €/m² |
| NPV | n/a yet | n/a yet |

Calculated energy consumption:

before renovation: 498 MWh/year

after renovation: 272 MWh/year

calculated savings: 226 MWh/year

Actual energy consumption measured over a 4 months period:

before renovation

1/10-2010 -1/2-2011 420,90 MWh

after renovation

1/10-2012 -1/2-2013 226,41 MWh

**actual savings over 4 months** **194,49 MWh**

**Calculated energy savings**

Energy savings by reduced heat loss from the building envelope is 120 MWh/year.

Energy savings by reduced ventilation loss is 106 MWh/year.

Total annual energy savings : 226 MWh/year.

Increased running costs for the ventilation system: 13.400 €/year.

PV electricity production: 30.000 kWh/year = 8.000 €/year (electricity consumption in the common laundry).