Porto Meeting

The 9th and final meeting of the working phase of Annex 56 took place in Porto, Portugal, on September 16th, 17th and 18th 2015. Being this the last meeting of the project, a status of the works was made to the participants, mainly focusing on the documents and deliverables that have to be finished in the upcoming months.

Considering the activities that are still running, in particular the preparation of reports synthetizing and summarizing each task, the project has been extended by six months, until the end of 1st semester of 2016.

This final stage of the project will therefore, be dedicated to the conclusion of each subtask. Most of these documents are already in the final stage of revision by the IEA ExCO reviewers, and will be available for the general public in a very near future.

The partners had the opportunity to visit an energy renovated neighbourhood, in the outskirts of Porto. More information about this renovation process can be found in the following pages.

The Industry Workshop that was held during this meeting, is presented on the next page.

Shining Examples

The shining examples identified and gathered by the partners, were considered as one major output of the project. It allows home owners, policy makers, technicians, and others, to be familiarized and to be aware of the issues regarding energy building renovation.

By clearly presenting the barriers that were identified for each building, as well as presenting the decisions, options and solutions that had been put in practice, it is possible to know more into detail, examples that these types of renovations can effectively occur.

All of these shining examples, leading to a total of 18 buildings, are now available for download here.

A brochure containing not only the examples, but also a detailed explanation of the renovation process, was expected to be prepared from the beginning.

A first version of the brochure comprising 9 shining examples and detailed analysis was completed in May 2014 and can be downloaded here.

The final version of the brochure, compiling all 18 examples, is expected to be ready for download in the next months, being currently in the last stages of revision.

IEA EBC Technical Day - South Korea

The ongoing activities of Annex56 project were presented at the technical day of the International Energy Agency, Energy in Buildings and Communities Programme (IEA EBC), on November 11th 2015, in Seogwipo, South Korea.

Apart from the presentation of this and other annexes currently running, it was decided to extend the activities of Annex 56 until the 1st semester of 2016.

More information can be found here.
IEA EBC INDUSTRY WORKSHOP

“How to achieve the best performance in the renovation of existing buildings (lower energy consumption, lower carbon emissions, higher added value) with minimal effort (investment, workload, intervention in the building, hassle of residents)?”

September 17th 2015
Corpus Christi Convent, Vila Nova de Gaia

The Annex 56 Industry Workshop took place in the beautiful old monastery—Corpus Christi Convent—, recently converted into an office building.

Besides the participants of the Annex 56 meeting there were representatives of municipalities, companies, utilities, and technicians (architects and engineers).

The number of attendees was around 60, excluding Annex 56 partners.

Program:

- Policy making for energy and emissions reductions in existing buildings / Rui Fragoso (ADENE, PT) - download
- Barriers for the renovation and maintenance of large scale residential neighbourhoods / André Sanches Correia (GAIA Municipality, PT)
- Annex 56 General overview / Manuela Almeida (Minho University, PT) - download
- Annex 56 Shining Examples / Kirsten Engelund Thomsen (Aalborg University, DK)
- Main results from Annex 56 analysis of real case studies and generic buildings from the residential building stock of Annex 56 participating countries / Roman Bolliger (Econcept, CH) and David Venus (AEE INTEC, AT)
- ASCOT, a free tool for Cost Effective Energy and Carbon Emissions Optimization in Building Renovation / Ove Christen Mørck (cenergia, DK) - download
- Renovation Guidebooks for Policy Makers and Professional Owners / Nuno Baptista (ADENE, PT) - download

The session began with a presentation of the Portuguese energy policies and strategies for buildings, and the improvement of regulations dealing with energy performance and energy savings.

An overview of the Municipality strategy towards building renovation was made, focusing Vila d’Este neighbourhood renovation, as well the funding schemes that made possible that renovation.

The scope and aim of the Annex 56 project was also presented, as well as some findings and conclusions regarding energy related building renovation.

An insight of the upcoming documents to be publicly available was made, in particular the updated version of the shining examples brochure and the renovation guidebooks.
Like the shining example brochure, the renovation guidebook is also considered as one of the most important deliverables of the project.

It was identified, throughout the development of the project, the need to reach and communicate to two different targets, and so, it is expected to have two separate documents.

These guidebooks will be written considering the differences between these two targets - professional home owners, and policy makers - and will synthesize the findings and conclusions that were identified during the ongoing activities of the project.

The importance of such documents is critical, in order to provide the necessary information for the questions regarding energy building renovation that arise, among the people involved in the decision making process.

A set of recommendations will be included in these documents, focusing the main topics and ideas that should be taken into account, when considering the process of building renovation. Because not all of them are familiar with the inclusion of the energy aspects, in these types of renovation, the recommendations will work as tips, so that energy can be considered right from the early stages of planning.

Some examples and best practices are also to be included in the guidebooks.

According to the most recent timetable of the project, it is expected for these guidebooks to be available by the end of the first semester of 2016. Information about the development of these books will be sent to subscribers of the website.

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### Recommendations...

In order to change the mind-set towards building renovation, building owners and policy makers should take into account certain aspects when considering beginning a renovation process. A set of recommendations were formulated, considering the conclusions found in the development of the project.

**... regarding the renovation strategy**

- Whenever the *envelope* of a building or its *technical installations* need to be *renovated* to restore its *functionality*, it is a *good opportunity* to improve the *energy performance* of that building element once the extra costs will be easily recovered by energy savings.

- The *added value* of the building renovation results from the reduction of carbon emissions, energy use and global costs but also from *other benefits* improving the *building quality* and the *user wellbeing* (thermal comfort, air quality, internal and external noise, safety, aesthetics, ...).

- A *good starting point* for a major renovation with and without energy saving measures and/or installation of systems for renewable energy is *good collaboration* between all *stakeholders*, including the residents. This collaboration is beneficial for the entire renovation process and its outcome. The collaboration has to last during the entire renovation process and continue through commissioning and for some time after that.

**... regarding the intervention on the building envelope**

- To *optimize* the intervention on the building envelope, not only reducing energy use and *CO₂* emission, but also maximizing the *added value* to the building (by reducing life cycle costs, improving the building quality and the users well-being), it is *better to improve the energy performance of several elements of the envelope* than to costly maximize the performance of just one.

**... regarding the intervention on the technical systems, including the use of renewable energy systems**

- When a *conventional heating system* needs to be replaced, a *switch to renewable energies* is, in many cases, not only *ecologically advisable* as but also *economically attractive*.

- The replacement of the heating system is an excellent opportunity to carry out renovation measures on the building envelope as well, because the more energy efficient a building is, the smaller can be the dimension of the heating system.

**... for incentives**

- *Incentives* should *promote the combination of renovation measures* on the building envelope with a replacement of the *heating system*, in order to make sure that reductions in energy use and emissions are achieved most efficiently.
TECHNICAL VISIT - VILA d’ESTE - V.N. GAIA, PORTUGAL

It is common procedure in the meetings of the project, to have a visit to an energy renovated building. In almost all site visits, the building is later on detailed as a shining example.

In this particular case, the visit was to an entire neighbourhood and not a single building and it is not one of the shining example. In fact, the low depth of the intervention and its limitation to a few elements of the building envelope, doesn’t allow the project to be considered as a shining example. On the other hand, it is representative of many building renovation in Portugal and the intervention brought significant co-benefits to the building users.

Project summary

Vila D’Este is a densely populated neighbourhood, with approximately 17 thousand inhabitants, located in Vilar de Andorinho, in the municipality of Vila Nova de Gaia, Portugal.

This urbanization has a total of 109 buildings distributed over 18 blocks, with 2085 dwellings and 76 commercial spaces.

The main objectives of the energy rehabilitation of this social housing are to eliminate the existing anomalies, to suit current energy requirements and indoor air quality, and architecturally rehabilitate the neighbourhood, which makes this the largest operation of this kind, in course, in Europe.

Site: Vilar de Andorinho
Vila Nova de Gaia
Altitude: 155 m
Heating degree days: 1348 (base temp 18°C)
Owner: Vila Nova de Gaia Municipality
Energy concept: Vasco Freitas and Energaia
Description of building before renovation (building situation, building system, renovation needs and renovation options.

The buildings of Villa d'Este are based on a building system called "tunnel formwork." The exception to the system occurs only in stairwells, which are prefabricated, and are supported on ledges, in the walls of concrete of the adjacent "tunnels".

The façades are constructed of brick walls or blocks without insulation, there are some blinders in masonry, when the "tunnel" exists at the edge of the building. In turn, the cover was mostly coated with fibber-cement sheets, existing small terrace areas without any insulation.

The verified anomalies consist of low thermal comfort due to high heat transfer by the surrounding environment, poor ventilation, presence of infiltration and condensation, which translates in a negative impact on durability of building components and indoor air quality.

Description of the renovation

For the rehabilitation of Vila D'Este, Energaia developed the energy analysis based on RCCTE (Portuguese Thermal Performance Building Code), which enabled to validate the recommended energy improvement measures in the building envelope.

Roof

- Execution of metallic coating type "Roofzip"
- Introduction of 8cm thick Rockwool insulation and windshield vapour barrier, heat transfer coefficients of 0,39 W/m²°C and 0,38 W/m²°C, for upward and downward flow, respectively
- Application of Aeolian fans on top of the ventilation conducts of sanitary facilities

Exterior Walls

- Application of thermal insulation in external walls with expanded extruded polystyrene (ETICS), 5cm thick, heat transfer coefficients of 0,59 W/m²oC;
- Installation of panels and flaps in GRC (Glass Fibre Reinforced Cement);
- Replacement of window areas in buildings’ entrance doors, stairwells and storerooms;
- Installation of shading elements in window areas;

Funding

The "Energy Rehabilitation of Vila d'Este - Vila Nova de Gaia" represents an overall investment of 15 million Euros, 70% from national funds (QREN) and the remaining 30% by the municipality of Vila Nova de Gaia.

Based on this investment and the savings generated by the intervention of rehabilitation, it is estimated to have a payback of less than 12 years.
Energy savings

Considering the recommended improvements, namely the introduction of thermal insulation, improved glazing and installation of shading, the estimated annual energy savings are 10.3 GWh/year, the project has the potential to generate economic savings of approximately € 1.3 million/year.

In environmental terms, the revitalization will allow a potential annual saving of 4,800 tons of CO₂ emissions.

<table>
<thead>
<tr>
<th>Energy Savings</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Insulation (façade and roof)</td>
<td>43%</td>
</tr>
<tr>
<td>Glazing</td>
<td>3%</td>
</tr>
<tr>
<td>Shading</td>
<td>3%</td>
</tr>
</tbody>
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Concerning heating and cooling energy needs, improvement measures of thermal insulation will allow a reduction of energy consumption of dwellings in approximately 43% and 31%, respectively.

Thus, the concerned revitalization is based on the regulation requirements imposed by RCCTE (Thermal Performance Building Code) and estimates energy savings of around 40%.

The recommended improvement measures not only allow a reduction in the energy consumption in the neighbourhood of Vila d'Este, but will mainly improve thermal comfort and reduce constructive pathologies that were found, namely in terms of condensation.