

A System for Quality Assurance when Retrofitting Existing Buildings to Energy Efficient Buildings

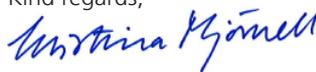
Dear Sir, dear Madame,

A while ago you received a newsletter announcing a newly founded project called SQUARE. Since then, a lot of activities have been going on in the project. The most important thing is the Quality Assurance (QA) system for improved indoor environment and energy use that has been developed and adapted to national conditions in the participating countries. The QA system has also been introduced in four pilot projects. You can read more about two of these projects in this newsletter.

We have also had an interesting workshop in Oulu, Finland together with the research project TES EnergyFacade, working with timber based element systems for improving the energy efficiency of the building envelope. The next meeting and workshop will be held in Graz together with the TRECO network. Good news are that the TRECO members from the UK

have shown interest in the QA system, which gives us further possibilities to spread information about the QA system and hopefully more experience from using it in real projects.

Kind regards,



Kristina Mjörnell

PhD, senior researcher
SP Technical Research Institute
of Sweden
Co-ordinator of SQUARE



Don't miss...

**The International Symposium
on High-Quality Thermal Re-
trofit of Large-Volume Buildings**

7 – 9 October 2009, City of Weiz, Austria

At the conference, which is organised by AEE INTEC and Stadtgemeinde Weiz, different topics on the renovation of the existing building stock will be discussed from a political, economic and technical/research point of view.

For more information visit www.aee-intec.at



7. - 9. Okt. 2009

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**PASSIVHUS
Norden**

27-29 April 2009
Göteborg, Sweden
Conference & Excursion

Don't miss...

**The Second Passive House Conference
27 - 29 April in Gothenburg, Sweden**

During the conference European and Nordic experts will be presenting and discussing the latest in the field of passive houses.

The conference will cover research and development as well as practice and implementation of passive house techniques.

For more information visit www.passivhusnorden.se

Partners

AEE Institute for Sustainable Technologies (Austria)

EAP Energy Agency of Plovdiv (Bulgaria)

TKK Helsinki University of Technology (Finland)

Trecodome (Netherlands)

TTA Trama Tecno Ambiental (Spain)

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➔ Development of a Quality Assurance system

A common QA system and guidelines

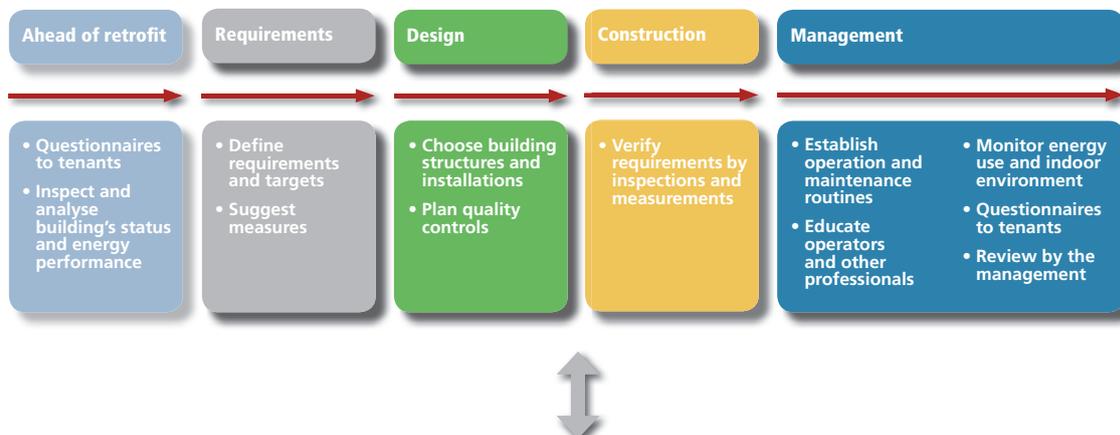
During 2008, the main work of the SQUARE project has been to develop a common Quality Assurance system for improvement of indoor environment and energy use when retrofitting social housing. A report describing the structure and the essential parts of the QA system is available, in English and Swedish, on the website. The report will also be published in Finnish, German and Spanish.

A support document – a guide on how to implement the QA system – is also under development and will be available on the website at the end of March 2009. The purpose with the guide is to review and highlight the formally written QA system in a more practical way. A number of useful documents will be included, such as checklists, procedural descriptions and templates, together with guidance on appropriate methods of measurement and instrumentation.

The main target groups for the reports, and the QA system, are organisations, co-operatives and privates, owning apartment buildings or social housing as well as consultants, contractors and suppliers involved in retrofitting of social housing.

The main elements of the implementation of the QA system

The overall objective of the quality assurance system is to ascertain that all predefined requirements on indoor environment and energy use performance are reached, i.e. that none of them is reached on too high expense of another. The quality assurance system must be based on a policy for retrofit work, highlighting the improved indoor environment and reduced energy use. The main phases of the implementation of the QA system for a renovation project are illustrated in the figure below. Continual improvement regarding the energy performance and the indoor environment conditions is part of the management phase.



The main phases of the implementation of the QA system for a renovation project

Governing and describing documents
Procedures Records Templates

National versions of the QA system – application in pilot projects

The next step in the process towards national versions of the QA system will be the application of the system in pilot projects in Austria, Finland, Spain and Sweden. Based on this, the partners of SQUARE will tailor the system according to specific national conditions. This will mainly affect the requirements on indoor environment and energy use.

In this issue of the newsletter the pilot projects of Austria and Spain are presented in more detail.

Download information material on QA system

On the SQUARE website a general brochure and presentation about the Quality Assurance system can be downloaded and freely disseminated. The information material is about to be translated into Bulgarian, Dutch, Finnish, German, Spanish and Swedish.



A report, a brochure and a PowerPoint presentation on the QA system are available in English on www.iee-square.eu



➔ The Spanish pilot project - Sant Joan de Malta street

The Spanish pilot project consists of a six apartment building, located in the old town of a neighbourhood in Barcelona. The building was built in 1890 and was in need of a complete renovation as it was extremely damaged.

Complete renovation needed

The surrounding buildings, which are attached to the pilot building on both sides, have similar structure but are in much better conditions. The retrofit consists of demolition and reconstruction of important parts of the internal partitions, improvement of roof waterproofing, and reinforcement of floors and external gallery in the posterior façade. The materials of the walls are typical construction materials used in Catalonia, principally wood (beams), bricks and stone (walls). One of the priorities of the retrofit is recovering the original materials such as the wood structure of the ceilings and the brick façades.

Measures carried out

To improve the energy efficiency and to apply quality assurance criteria, it was decided to better insulate the external walls, the internal divisions between stairwell and flat, the floor touching ground and the roof. The obtained U-values are equal to the values of the Spanish Building Rules, which in the climate location of Barcelona city means 0.74 W/K,m² for external walls and internal partitions, 0.50 for roofs and 0.65 for floors.

Natural ventilation, heat-recovering winter system and free cooling summer solution were also investigated and included in the project. The thermal system of the building is collective; including both space heating and hot water (this kind of system is unusual in Catalonia). The building performance was simulated with the Trnsys and Calener (energy certification) software, in order to obtain energy consumption and estimated emission data. The energy certification result was intermediate (C class). The main contributor to the relatively high CO₂-emission value is the heating demand; therefore various high-efficiency boilers were tested in simulation studies to improve the performance result. The best emission result was obtained with the biomass fuel (A class), but finally the solution of a natural gas condensation boiler with an efficiency of 110% (with a final building qualification of B class in the energy certification) was selected. The final predicted heating demand is 25.2 kWh/m²,year. The estimated value for CO₂-emissions is 9.4 kgCO₂/m²,year. It can further be mentioned that it is unprofitable to install solar thermal collectors for hot water because of the shadows that the surrounding buildings generate on the roof.

Implementation of the SQUARE QA system

The SQUARE QA system has partially been applied during the design phase and progressively more during the retrofitting phase.

During both periods, a deep cooperation between the property owner, developer, architects and engineering consultancy has resulted in continuous improvements of the building's thermal conditions and general system performance. Periodical site management visits and meetings with the constructor managers and installers have guaranteed a better understanding of innovative energy solutions.

The retrofit work of the pilot project is now only slowly progressing due to the building crisis, which is especially dramatic in Spain.

Contact person: Jaume Serrasolses, TTA Trama Tecno Ambiental S.L



The Spanish pilot project



➔ The Austrian pilot project - Dieselweg

A renovation of totally 212 apartments built in the 50's, 60's and 70's is being made in this Austrian pilot project located in Graz. The SQUARE participant, AEE Institute for Sustainable Technologies, is following the project, especially regarding improvements of the indoor environment and energy performance.

A new vision for apartment houses in Graz!

The construction work of the pilot project "Dieselweg" was started in summer 2008. The tenants of these multi-family houses were very positive to the improvements of their apartments, which is understandable as the situation of the 204 dwellings was not very good to start with.

The building stock was built in the 50s, 60s and 70s and since then no improvement measures had been carried out. The heating supply was decentralised, and 13% of the flats were heated by solid fuels, 33% by heating oil and 54% by night-storage heaters. In January 2007, the non-profit-making housing association "GI-WOG" took over the residential area. They made a plan to retrofit all the apartments. Three different types of houses, as shown in the pictures to the right, are being renovated.

What measures are planned to be carried out?

All building blocks will get a new building envelope including new windows. The new envelope will cover the old façade and enclose the balcony slabs. The former outside area of the balconies can then be used as living space, which means that the effective floor space of each dwelling will be increased with a few square meters. Through additional insulation of the exterior walls the transmission heat losses will be minimized. For example, the heat demand of the first retrofitted objects can be decreased from 184 kWh/m²,year to 10 kWh/m²,year. Further, the heating system will be changed to a centralised system, supported by solar energy and Graz district heating system. Additionally, a single-room ventilation system with heat recovery will be installed in the main living rooms and in the sanitary rooms.

Prefabricated modules

New pre-fabricated façade modules are mounted on the old building façade. New pipes and cables are installed on-site in the space between the old and new façades. A positive consequence of this method is that all tenants can remain in their flats during the renovation. The entire mounting process is done outside their living space. After the mounting of the new elements, the old windows are removed from inside.

What are the advantages for the tenants?

The advantages for the tenants are clear:

- The tenants can remain in their flats during the construction work.

- The living space will increase, due to the new area from the enclosed balconies.
- The running costs will be decrease due to that the ventilation and transmission heat losses are minimized, including removal of thermal bridges.
- All pipes and cables are renewed.
- In the course of the retrofitting, new elevators are installed, thus every flat can be reached without stairs.
- The living comfort and indoor environment will increase due to increased temperature of inner surfaces, removed construction damages and adequate supply air volume.

To be ahead in retrofitting!

An important prerequisite for good indoor environment and energy performance is to focus on continual improvement, both during the construction and operation stages. To continue the dialogue with the responsible persons, AEE initiated a discussion of methods for quality checks after the retrofitting process. This makes it possible to verify that requirements are fulfilled.

AEE informed about the various possibilities of how to check/ follow-up on the performances of the retrofit actions. Examples of measurement values that could be monitored, affecting the indoor climate, are the frequency of overheating, air humidity and temperatures of radiators. Regarding the energy consumption, the electric power consumption, the total energy consumption and the primary energy consumption could be measured.

Contact person: Sonja Geier, AEE Institute for Sustainable Technologies



The Austrian pilot project



➔ 3rd meeting & Workshop

September 2008 in Oulu, Finland

At **the third meeting** in the SQUARE project, the work progress of different activities was presented and discussed. Particular focus was given to the first version of the common quality assurance (QA) system which was thoroughly discussed. Furthermore, presentations on the progress of the pilot projects in Sweden, Austria, Spain and Finland were made.

Main conclusions were that:

- The common QA system is suitable as a foundation to build national QA systems on. It serves as a least common denominator that all participants should consider. At this early state of development, and also considering the large variety of national conditions that prevail, it will not be possible for the project to deliver a complete system that suits all participating countries.
- The QA system cannot be forced onto the SQUARE pilot projects but the system will be introduced to the organisations and then the process will be followed to see how the projects are applying the different parts of the system.

At a joint session with people from another research project, **TES EnergyFacade**, both projects were presented and ideas and suggestions were exchanged.

The participants also visited **the Finnish pilot project** that is about to be renovated. It consists of a student house with 33 apartments built in 1970. The goal of the renovation is to reach passive house standard level, which for northern Finland is 30 kWh/m² per year for heating energy.



The Finnish pilot project

An interesting workshop was held together with the TRECO group, which is a network of social housing associations/owners. Activities and cooperation with the SQUARE project were discussed. TRECO members from the UK showed interest in adjusting the SQUARE QA system to UK conditions. To exchange experience from different pilot projects is another topic of interest for cooperation.



Joint workshop between the SQUARE project and the TRECO group

The next SQUARE project meeting, which will also involve a workshop with the TRECO network, will take place in Graz, Austria on 9 - 11 of March.

Interested in more information?

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