

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

Dear all,

After two and a half years of intensive activities the SQUARE project has now come to an end and this is the last newsletter distributed to all you subscribers. Working in this project has been a great experience for me personally and professionally, meeting all these competent and interested people with enthusiasm and energy to do something good for the built environment.

The partners have developed the Quality Assurance (QA) system for energy efficient renovation and applied it in four different pilot projects. In addition, the QA system has also been used by participants from the TRECO network, whom we have met and shared knowledge and experience with throughout the project. This has been a fruitful cooperation between the two groups with representatives from research and housing associations.

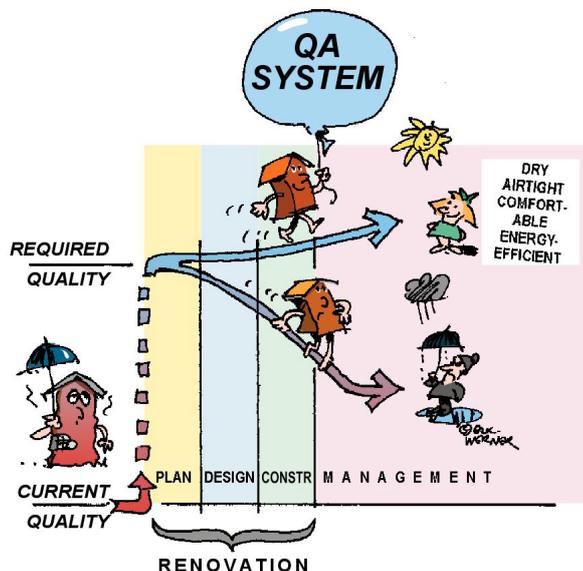
I want to thank you all for taking part in or reading about the progress of the SQUARE project and I hope to see you or hear from you soon again.

Kind regards,



Kristina Mjörnell

PhD, senior researcher
SP Technical Research Institute of Sweden
Coordinator of SQUARE



Don't forget to download reports, brochures and PowerPoint presentations on the SQUARE Quality Assurance system, available in different languages at www.iee-square.eu.

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)
- Poma Arquitectura (Spain)
- SP Technical Research Institute of Sweden (Sweden)
- AB Alingsåshem (Sweden)





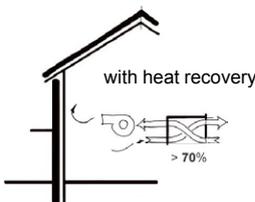
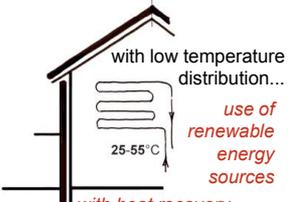
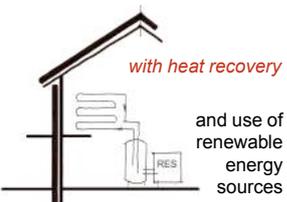
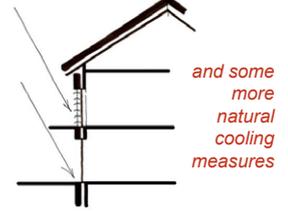
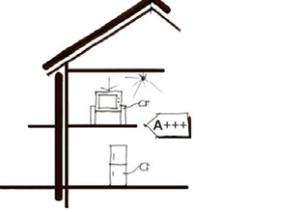
➔ Energy improvement measures

Ambitious and high performance retrofit of the residential buildings of the SQUARE pilot projects lead to energy savings up to 80 or 90%. A report has been compiled describing ten important energy improvement measures, leading to satisfying building performance and comfortable indoor environment - also during

the operation phase. The description of each measure includes information about values, their verification systems, and "best practise" examples and links. Since the climate varies in the European countries the decision was to present measures in three different European climates to meet the special requirements of them.

The most relevant energy efficient measures for heating and cooling of renovated residential buildings in three European climates

(Reference: AEE INTEC)

	W warm	T temperate	C cool
Heating	<p><i>Insulation, airtightness and optimized ventilation system</i></p>  <p>with heat recovery > 70%</p>	<p><i>Insulation, airtightness, optimized ventilation and heating system</i></p>  <p>with low temperature distribution... 25-55°C use of renewable energy sources with heat recovery</p>	<p><i>Insulation, airtightness, optimized ventilation and heating system</i></p>  <p>with heat recovery and use of renewable energy sources</p>
Cooling	<p><i>Natural cooling, external shadowing, user's briefing/behaviour and optimized ventilation</i></p>  <p>with free cooling</p>	<p><i>External shadowing, user's briefing/behaviour</i></p>  <p>and some more natural cooling measures</p>	<p><i>User's briefing/behaviour and external shadowing</i></p>  <p>A+++</p>

➔ Information dissemination

Recent events

At a national workshop in Graz, Austria, in November, regarding retrofit actions in the building stock, the SQUARE quality assurance system was presented. The overall question of the workshop was if "Profitability and quality is a contradiction?"

At the **European Construction Technological Platform (ECTP) conference** in Brussels, in November, the SQUARE project was presented by Kristina Mjörnell (the coordinator of SQUARE).

Kristina Mjörnell has also presented the implementation of the QA system in the renovation process - with practical examples from the Swedish pilot project Brogården - at a number of events, such as the **Swedish National Energy Convention 2010** in Stockholm, a **national seminar at Byggcentrum** (a Swedish center providing building related information to building owners located near Gothenburg) and a **Bulgarian workshop** in connection with the SQUARE project meeting in Sofia, all held in March.

Upcoming events

Information about SQUARE will be disseminated at number of upcoming events, such as:

- The **"Building Days"** at SP Technical Research Institute of Sweden, Borås, at 29-30 September 2010
- The **Passive House Conference**, in Aalborg, Denmark, at 7-8 October 2010
- The **37th IAHS World Congress on Housing Science**, "Design, Technology, Refurbishment and Management of Buildings", in Santander, Spain, at 26 - 29 October 2010



➔ Status of the pilot projects

The Austrian pilot project - Dieselweg

A renovation of totally 212 apartments built in the 50's, 60's and 70's has been 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.

The last construction works and the commissioning phase were finished at the end of 2009, and were followed by the start of the monitoring phase that will continue into 2011. AEE INTEC, together with gap-solution - the building contractor, collects the data from the monitoring system, although there are still a few troubles with the data gathering method. AEE INTEC has identified households for the first interviews after the completion of the renovation. There are still actions carried out related to the complaint management.

For the good practices at Dieselweg, the building company GIWOG was awarded with the "Energy Globe Styria" and the "Austrian Climate-Protection Award" in autumn/winter 2009.



Austrian pilot project: new façade on the renovated building

Contact person: Armin Knotzer, AEE Institute for Sustainable Technologies

The Swedish pilot project - Brogården



Swedish pilot project: the renovated houses put to the test!

The municipal housing association Alingsåshem is renovating an area of houses, called Brogården, according to passive house principles. The houses that were built in the 70's are experienced as draughty and "outdated".

The renovation of the three first building volumes has now been completed and the tenants have moved in. The first winter in the refurbished houses offered a tough testing as Sweden experienced the coldest winter in 23 years! With few exceptions,

the tenants have been satisfied with the performance of the buildings. The heating energy used has been approx. 18.5 kWh/sqm tempered floor. Prior to the refurbishment this figure was estimated to 115 kWh/sqm. During February the tenants of the fourth building moved out and the demolition of facades started at the beginning of March.

During the cold spell in February the EZA (the German Energy & Environmental Centre Allgaeu) training programme for certified passive house planners visited the area. Other activities include two days of measurements of the indoor environment in six apartments. Interviews were also made with the tenants in these apartments.

The SQUARE system has been implemented in the existing QA system and in the operation and management systems. Meetings have been held with personnel in service and maintenance to find methods for integrating quality assurance in the daily work. This has resulted in protocols for current inspections that have been adopted to the QA system, the standardisation of registered complaints and actions to make them useful in the strategic planning of the development of the building stock, etc. The work is ongoing, and the overall result is a more complete picture of future needs, a more efficient process that makes indoor climate and energy performance visible and analysable early in the decision making, and also offers efficient routines and checklists for planning and communication.

Contact persons: Ing-Marie Odegren, Alingsåshem and Anders Kyrkander, Passivhuscentrum



➔ Status of the pilot projects *cont.*

The Spanish pilot project - St. 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. The project is now practically finished.

During the months before summer 2009 work followed at a slower pace than it was planned (due to the current economic crisis). During this time tests were carried out on:

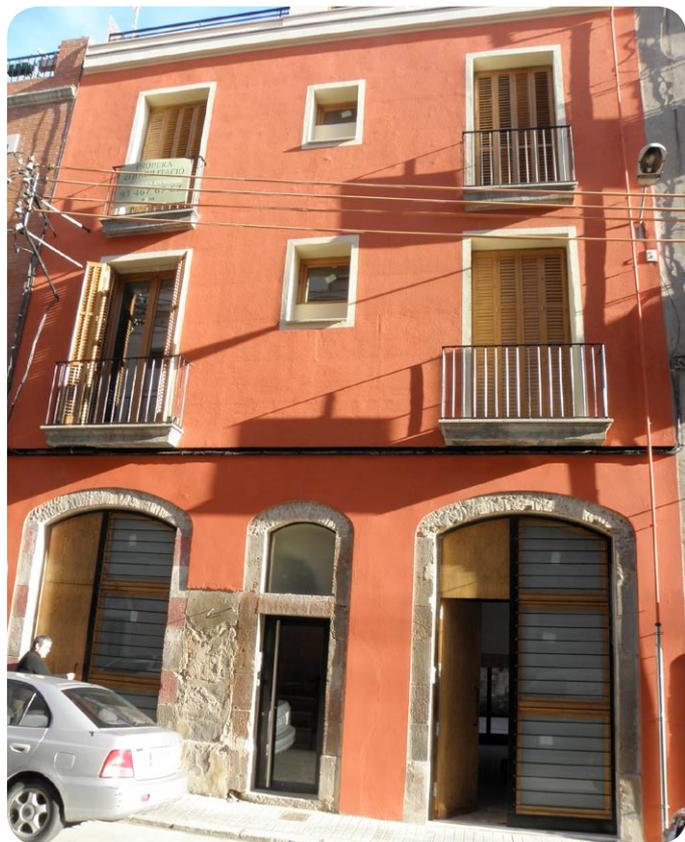
- air and water tightness
- air exchange rates
- recovery energy system and CO₂ sensor
- insulation's performance
- verification of the correct installation of all appliances and lighting.

In September and October interior rooms, kitchens and toilets were finished. At the same time the flats began to be marketed.

Surprisingly, four out of the six flats were occupied much earlier than expected (given the serious economic crisis in Spain). Consequently it became necessary to switch on utilities (gas, heating, water...) more quickly than planned.

For this reason TTA and POMA are preparing a user guide that includes instructions for the proper use of the building and its building services (the thermal services and heat recovery), as well as how to obtain a good indoor environment. We are also working with the thermal system maintenance staff to start-up the boiler and all its components.

To track the consumption of each apartment, the project has provided an energy meter (for space heating and hot water usage), an electric meter and a water meter. To distribute the cost of gas consumption, TTA and POMA have just been developing a software that they are going to deliver to users and to the property manager. For at least one year, POMA and TTA will monitor



Spanish pilot project: the exterior

the consumption of the building and compare it with the project's forecasts, as well as with the consumption of a similar building where energy improvements have not been implemented.

The conclusion of implementing the SQUARE Quality Assurance system, by all the different parties involved in the work, is that the experience has been very positive. It has generated significant improvements in the work, in the construction process and in the delivery and transfer to the final users.

Contact person: [Jaume Serrasolses](#), TTA Trama Tecno Ambiental S.L

The Finnish pilot project - Student house Pohjankaleva

Read more about the Finnish pilot project in the SQUARE newsletter no. 2 2009, which can be found on the SQUARE website.

Contact person: [Jari Palonen](#), TKK Helsinki University of Technology



Spanish pilot project: the interior



➔ An interesting Finnish project

"Climate change" of multi-storey housing - improving the energy economy and the indoor climate

This project is part of the Development Program of Finnish Suburbs

Project description

Finland had a housing construction boom from the 50's to 70's. The majority of new apartments were built at that time in multi-storey blocks of flats. Many suburban areas consist mainly of this kind of housing, and they could be both rental and owner occupied. This housing stock needs thorough renovation in the near future. The attractiveness and quality of dwellings is a key issue for the future of a suburban area.

There is a huge work to renovate housing of different age to meet tomorrow's environmental challenges, such as reducing the energy consumption. Refurbishing of buildings should be executed with simultaneous improvements of their energy conditions. In any case, these conditions should not decline. Measures to improve energy economy and indoor air quality should be integrated with other necessary, unavoidable refurbishment tasks, in the life cycle of a building. Other parts of a building that could be in need of refurbishment are for instance facades, windows, heating and piping installations, sanitary facilities etc. One main concern is to obtain sufficient ventilation.

The timing and intended processes of renovation works are essential. Housing companies (condominiums) are a special problem. Decision making and financing are different compared with real estates owned by one owner like social or rental housing usually are. Therefore, main target groups of this project are the owners and inhabitants as well as the building stock of housing companies.

The wording "climate change" in the project means three different points of view:

- The global climate change affecting renovation needs of buildings
- Improving indoor climate of housing to be renovated
- Mental climate change of owners and occupants in a renovation process

The aims of the project

The aim is to develop practical solutions and effective processes for the life cycle management of the targeted housing stock.

The aim is also to produce examples of simultaneous improvement of energy economy, indoor quality and co-operation culture of housing communities. These three components form the balanced climate change of a housing unit.

The deliverables of the project

1. Tools for decision making and management of renovation projects. When, how, and in which combination of works?
In addition to individual buildings or housing companies, also

group or areal type of renovation processes will be considered.

2. Examples of functional processes in various types of cases. Preliminary planning, construction management, design and execution phases will be covered. Special problems of housing companies' decision-making and communication both internally and between neighbouring housing companies will be considered.
3. Information on available solutions, services and resources.
4. Good examples, success stories.
5. Evaluation of future development and experimental construction needs.

The project group and the work plan

The participants of the project work are:

- Helsinki University of Technology, HVAC
- VTT Technical Research Centre of Finland
- The Finnish Real Estate Federation

Three suburbs typical to the targeted time and stock have been selected to co-operate in the project:

- Maunula, City of Helsinki
- Matinkylä, City of Espoo
- Keijupuisto, City of Lahti

A group of enterprises representing design, contracting and manufacture is participating in the advisory board of the project.

Project's working phases:

1. The knowledge survey phase.
2. Inventory of the participating suburbs, calculations and simulations.
3. Producing renovation concepts for the example buildings.
4. Analyses and proposals for measures.
5. Reporting and dissemination.

Communication and networking widely with other activities in Finland is an essential part of the working method. The national communication program "Tee Parannus" is the main gate to the public.

Time schedule: April 2009 to May 2011

Contacts persons:

Jari Palonen, TKK Helsinki University of Technology
Jyri Nieminen, VTT Technical Research Centre of Finland
Markku Rantama, The Finnish Real Estate Federation (project coordinator)

For more information visit www.teeparannus.fi/kimu



➔ 6th meeting & Workshop

Meeting held in March 2010, in Sofia, Bulgaria

The last project meeting of SQUARE was held in Sofia, Bulgaria and hosted by our partner EAP from Plovdiv, Bulgaria. It started with a get-together dinner at a typical Bulgarian restaurant full of Bulgarian families celebrating mother's day. The next day was an all-day meeting trying to tie together the different parts of the project and plan for the completion and making of final reports.

Workshop with Bulgarian stakeholders

The second day was devoted to a workshop with Bulgarian stakeholders held in REHAU's building. The Square partners took the opportunity to present the implementation of the QA system in the pilot projects in Sweden, Austria, Barcelona and Oulu. In addition, Chiel Boonstra presented the retrofitting of a project in Roosendaal.

After lunch there was a tour in REHAU's building, which is the first "almost passive house" building in Bulgaria. A representative from REHAU showed us plastic framed windows for new passive houses with an U-value of 0.73 W/m²,K as well as windows developed to suit renovated buildings.

Tatyana Stoyanova working for the UNITED NATIONS DEVELOPMENT PROGRAMME presented a demonstration project for renovation of multifamily buildings in Bulgaria. There are more than 80 000 multifamily buildings in Bulgaria with 700 000 residential housing units, many of them in need for renovation, which means a needed investment of approximately 4 Billions Euros. Hence, the SQUARE project is a much needed project. Up till now, 27 multifamily buildings have been renovated and 27 buildings are undergoing renovation. However, there is much more that could be done in order to make these buildings energy efficient buildings with good indoor environment.

In Bulgaria, 96% of the condominium buildings have private ownership which creates problems with decision making when these buildings are to be renovated. The renovation measures, e.g. the changing of windows and putting additional insulation

on the façade, are often procured and managed by the owner of each separate apartment. There is often a social mix of owners with different financial possibilities to undertake refurbishment which mean that some apartments are renovated and some are not. There is no tradition in management and maintenance of multifamily buildings. An effective renovation process requires advanced technical knowledge and skills as well as professional management. Unfortunately, the newly adopted Condominium Law does not encourage the creation of associations (legal persons) for the management and renovation of a common property.



Multifamily building in Sofia. One building can have as many types of windows as there are apartments.



Technical tour in REHAU's building

Interested in more information?

Contact Kristina Mjörnell, Co-ordinator

SP Technical Research Institute of Sweden

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