

European NZEB Conference 2013

Demonstration projects of nearly zero-energy housing renovation as a vehicle to market development

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1. Introduction

The EU 'Energy Performance of Buildings Directive' (2010/31/EU) requires Member States to ensure that all new buildings which are constructed by 2021 are nearly zero-energy buildings. This requirement takes effect in 2019 for public buildings. Actions and measures must be taken to increase the number of nearly zero-energy buildings for both new and existing buildings. The number of new buildings is only a fragment of the complete building stock, and with the current rate and depth of renovation a large potential on energy savings is being neglected with the risk of not reaching the EU policy goals.

In most countries implementation of holistic energy efficient solutions in the housing sector is still at an early market development stage. However, the state of the art regarding available technology solutions is rather at an advanced level. Also, there are emerging examples of deep renovation that can be used for knowledge, experience, awareness raising and promotion. To realise these high quality house renovations as well as increase in their number, novel business approaches for this emerging market are needed.

Therefore, an important issue that remains is *how to move from demonstration projects to volume market for such integrated solutions?* This market development issue has been studied for several construction subsectors in different international research projects [1], for example the IEA/SHC Task 37: Advanced Housing Renovation with Solar and Conservation (July 2006 to June 2010) [2]. One of the subtasks looked at how to “Develop specific market strategies together with companies, authorities, research institutes or other market players participating in the Subtask”.

Also, two other research projects were executed with a specific focus on barriers for massive uptake of low energy house renovations and its market development, focusing on the region of Flanders, northern Belgium. These projects are:

- The project “Inventory of deep energy renovations of houses”, requested by the Flemish Energy Agency (VEA) and delivered by The Flemish Institute for Technology Research (VITO) in collaboration with the Flemish Passive House Platform (PHP, Passiefhuis-Platform vzw) [3]. The main objective of this project was to provide the Flemish Energy Agency an overview of national and international research results regarding deep home renovations.
- ERANET-ERACOBUILD project “One Stop Shop - From demonstration projects towards volume market: Innovations for sustainable renovation” led by the Belgian Passive House Platform (September 2010 to August 2012) and in collaboration with the Belgian Building Research Institute (BBRI), Danish Technical University (DTU), a Norwegian business consulting company (Segel), and the Finnish research centre for construction (VTT) [4]. The overall project aim was “to facilitate market penetration (volume market) of housing renovations for single family houses of very high energy standard while providing superior comfort and sustainability to occupants.”

2. Inventory of deep energy renovations

As part of activities relating to the Action plan for nearly zero energy buildings, the Flemish Energy Agency (VEA), commissioned a study by VITO and PHP to assess how the uptake of deep energetic building renovations can be facilitated and accelerated. A deep energetic renovation goes beyond single energy conservation measures, and requires a comprehensive strategy to reach a low energy -or even ‘nearly zero’ energy- target in existing buildings. This integrated view on the energy performance of an existing building leads to avoid limited standalone interventions, which can ‘lock-in’ future renovation plans, and can cause a recently renovated building to become outdated in a few years because of consistently sharpening market expectations.

Within this study, the project team made an inventory of 61 national and international research projects concerning low energy renovations. Furthermore 50 exemplary projects of actual building renovations were selected and studied. This work resulted in a list of 180 promising solutions for low energy renovations.

Further analysis led to the identification of 23 themes, such as 'improve access to skilled workforce', 'availability of suitable building materials', 'design tools with integrated life cycle costing', 'create a culture of innovation', 'new financial products which consider the pay-back effects', etc. These themes were further combined into four main strategic clusters:

1. Innovative financing
2. Support of technical innovation for building renovation
3. Secure qualitative renovation processes
4. Building knowledge and communication

These strategic clusters of related solutions, can reinforce each other and are preferably treated simultaneously to attain a leverage effect.

In order to put these strategic clusters into practice, cooperation between all relevant actors (building owners, constructors, research, financial sector, educators,...) is essential. Thresholds for these structural collaborations are expected to be the main barriers to the massive uptake of deep energetic renovations in Flanders. Policy actors have an important role as facilitator by supporting early adopters and encouraging challenge driven innovation.

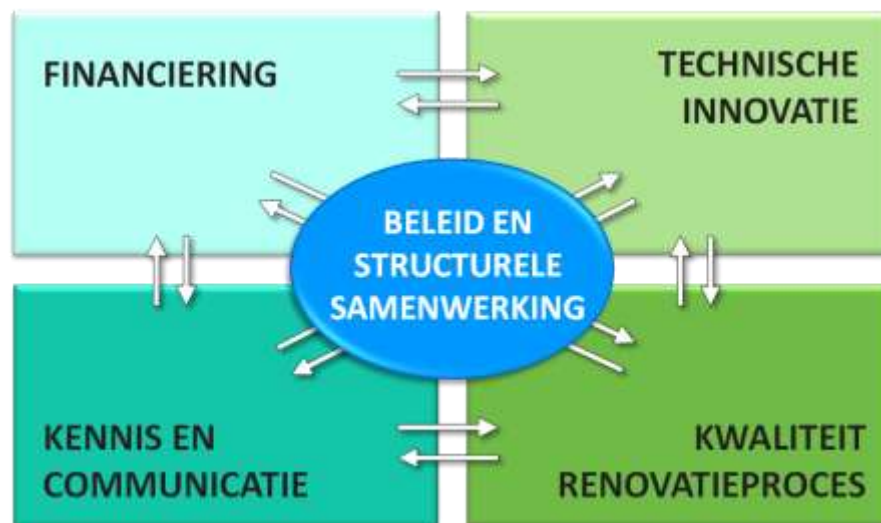


Figure 1. showing policy and structural collaboration in centre, and connection with technical innovation, finance, knowledge and communication, quality of the renovation process.

Although the four strategic clusters for strengthening the uptake of energetic renovations require a collaborative effort, the actual tasks may differ according to the expertise and the specific position one has in the whole building chain. Therefore the research project formulated documents with specific tasks for different target groups such as contractors, educators, financial institutions and construction materials producers for each of the four strategic clusters. These documents also make a reference to noteworthy real life examples which were inventoried in the first phase of the research project.

Finally, the research project formulated some concepts which can help to spread trustworthy information on deep renovations to the various target groups and provide them with incentives to appropriate targeted and concerted structural action.

The Flemish Energy Agency has foreseen to develop the appropriate communication instrument to disseminate the relevant actors.

3. Development of a communication model for promoting nearly zero-energy renovation

The 'One Stop Shop' project addressed an important challenge to shape regional supply chain collaboration to effectively increase the number of deep energy house renovations taking place. Any new product or service has to be adopted first by the innovators in the introduction phase and thereafter the early adopters in the growth phase before it can reach the early majority in the volume market. To fully exploit the market development potential, the innovator activities should serve as input for a strategic reflection by actors which consider taking an active part in developing the market for advanced housing renovation. In this context, deep house renovation leading to nearly zero energy house is an innovation on the market, since this type of renovations are emerging at present on the construction market in Flanders.

Current fragmentation – different SMEs doing fractions of a supposedly integrated renovation – cost management, lack of knowledge and lack of project management were detected to be very important barriers for advanced energy renovation of single-family housing. However, companies are showing interest to collaborate and expect their share in this market segment to grow. Our research found that renovation processes need to be reformulated and better collaboration structures need to be developed to unburden the client. In order to better respond to the detected supply side concerns, supply and demand side actors need to be informed more targeted. A 'One Stop Shop' web portal can both inform actors, as well as unburden the client.

Five steps in home-owners innovation-decision processes (information, persuasion, decision, implementation, confirmation) were used as a basis for the development of an improved communication model and web platform.

The One Stop Shop partners also related actor categories to the homeowners' innovation-decision phase in the partner countries (Belgium, Norway, Denmark, Finland) and identified a common need to develop a pool of experienced actors for implementation and quality-assurance, as well as a need for support schemes for integrated renovation. Collaboration by different actor categories would support the market development that is needed, as well as the development of a web platform.

This work resulted in outlining the development of a Flemish One Stop Shop web portal that effectively uses available information from found exemplary house renovations. To stimulate innovation in supply side, supply chain collaboration and end-user adoption of innovation, we suggested developing an 'innovation'-oriented web portal for the promotion of integrated renovation. This web portal targets various groups of supply-side actors: architects, consultants, contractors, installers. It links their supply of integrated highly energy-efficient housing renovation with possible demand of homeowners. Such a web development has been tried out in various countries, but the One Stop Shop project detected that existing websites show various shortcomings in the promotion of integrated renovation, available innovations and possible integrated supply chain services. The development of a new Flemish web portal was based on the five consecutive steps in innovation-decision processes (information, persuasion, decision, implementation, confirmation). The web portal development paid careful attention to:

- Promoting socio-technical innovation in the supply side
- Realizing customer awareness for integrated renovation
- Using demonstration projects as trusted sources

- Recommending training to professionals
- Guiding customers step-by-step to integrated renovation
- Stimulating supply chain collaboration of SMEs
- Providing independent neutral information
- Closing the information loop, including customer feedback and quality assurance

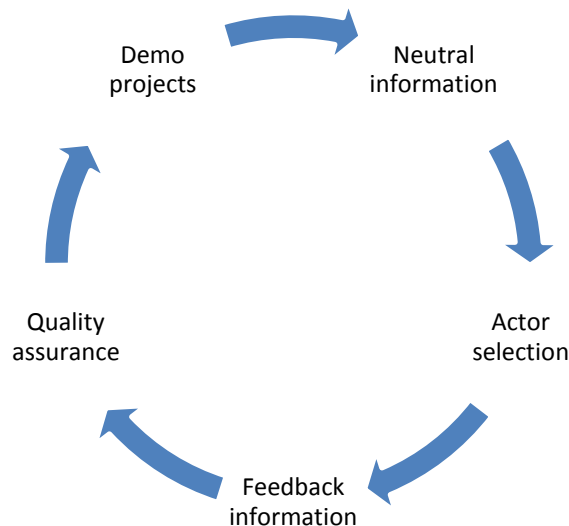


Figure 2: Methodology for a web portal proposed in the One Stop Shop project to promote nearly zero-energy home renovation.

4. Development of a public actor list for promoting nearly zero-energy renovation

The big challenge is, how house renovation service can be kept high-quality and independent, while maintaining and developing partners' and customers' trust. Nowadays customers share experiences online. On the other hand, various interviews with clients and public actors showed that there is a specific need for clients and procurers to easily find experienced actors, particularly architects, contractors, consultants and installers. The study defined in detail how such a public actor list could be organized for marketing and selection of innovators – the front runners in renovation services, using the situation in Flanders, northern Belgium, as an example.

The Belgian partner Passiefhuis-Platform vzw (PHP) – a non-profit organization – explored the opportunity of developing a public actor list for sustainable housing renovation using available information on regional/national demonstration programmes, projects and related actors. In the end, an actor listing was published for eliminating the barrier of the difficulty for the homeowner to find appropriate and experienced actors, as step towards increasing demand for integral renovations by homeowners to which the companies should answer with service solutions, amongst which the One Stop Shop approach is one of the possibilities. The public list of actors (Flanders/Brussels) was launched and distributed in Belgium at the Passive House 2012 Professional Day on 7th September 2012 at Tour&Taxis in Brussels, where also the final workshop of the One Stop Shop project was held.

The growth and continuation of the listing is still a challenge. An improved coupling is needed with existing labels, energy performance certificates, customer feedback, quality assurance and development of courses for professionals.

5. Conclusion

An extensive inventory of research projects and executed renovation projects led to the identification of four strategic clusters of solutions to assure the uptake of deep energy renovations:

1. Innovative financing
2. Support of technical innovation for building renovation
3. Secure qualitative renovation processes
4. Building knowledge and communication

Cooperation of all relevant actors is crucial to put these strategic clusters into action.

Although demonstration projects of nearly zero-energy housing renovations are available at this emerging market, the current fragmentation – separate SMEs each responsible for a fraction of a supposedly integrated renovation – cost and time escalation, lack of knowledge and lack of project management are very important barriers to the advanced energy renovation of single-family housing. Our research has found that renovation processes need to be reformulated and better collaboration structures need to be developed to unburden the client. Also, both the supply- and demand-side actors need to be informed in a more targeted way. The developed One Stop Shop communication model and web platform provide a solution to this communication problem.

To fully exploit the market development potential, the innovator activities should serve as input for a strategic reflection by actors which consider taking an active part in developing the market for advanced housing renovation. A direct opportunity to make innovator activities visible was found in the development of an actor listing. Such a listing eliminates the barrier of the difficulty for the homeowner to find appropriate and experienced actors. It also serves as one step towards increasing demand for nearly zero-energy renovations by homeowners to which the companies should answer with integrated solutions. It is also an essential element of a more holistic One Stop Shop web portal development.

Acknowledgements

Funding for this research was obtained within the VEA project “Inventarisatie van doorgedreven energetische renovaties van woongebouwen”. The Flemish partners VITO and PHP were funded by VEA. Funding for the One Stop Shop research was obtained within the ERANET Eracobuild project “From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation”. The Flemish partner PHP was funded by IWT, the agency for innovation by science and technology of the Flemish Community.

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