

Developing an integrated offer for Sustainable Renovations

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Abstract:

Within an ERANET-ERACOBUILD project, this study investigates the opportunities and barriers to establish a “one stop shop” with an integrated supply side, to counteract the fragmented offer in sustainable renovation of single-family houses and to increase the level of knowledge, skills and innovations. Aspects of providing reliable information and guidance for house-owners are also included. Starting from a survey directed to the Flemish construction sector, we tried to distill the viewpoint and willingness of enterprises to cooperate in such a one-stop-shop idea.

The survey concludes that the increase of holistic very low energy renovations is expected in a short time and that a large percentage of companies is willing to work together. However, socio-technical and know-how barriers to accomplish this still remain. With these results - and an analysis of existing websites providing an interface between suppliers and owner-occupants - business models, training and other activities will be set up to establish a one-stop shop model within the continuation of this project. A test case is foreseen.

Keywords:

Renovation, Energy Performance, Innovation, Quality, Demonstration Projects

1 Introduction

European building policies have led relevant national authorities across Member States to focus on energy efficiency and renewable energy. Member States are preparing action plans, setting goals for existing buildings, whereby renovation of residential buildings is an important focus. To achieve these goals, the current renovation market drastically needs to change, both in volume and execution of holistic very low energy renovations, with innovative solutions for technical and non-technical barriers.

A socio-technical challenge is to reach different target groups from a holistic perspective. Currently, one of the important barriers is the fragmentation of the renovation process between different enterprises – and related measures - on the one hand, and the lacking possibility for the building owners to find all necessary information for holistic very low energy renovations of single family houses in a structured way on the other hand.

In this paper we present the key findings of a survey directed to the Flemish (Belgian) construction enterprises, where we asked about current renovation practice, viewpoint on the prospects and potential activities of the holistic house renovation market, and their willingness to cooperate with different actors within the value chain.

The goal of the survey was to determine what enterprises expect from the market for holistic very low energy house renovations, how they preferably would like to collaborate with actors, and what ways can be defined to exchange knowledge and to increase the demand for holistic renovations on the market.

Related research activities, aiming at establishing an integrated offer for sustainable renovation were also performed and will be presented in order to reflect on results. Complementary research includes: an analysis of existing websites providing an interface between suppliers and owner-occupants (Mlecnik et al., 2011) and business models with test cases for the development of a one-stop-shop for renovation (Haavik et al., 2011).

2 Background

The initial idea of the ERACOBUILD project entitled “One Stop Shop - From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation” came from conclusions of several previous research projects:

1. Low Energy Housing Retrofit www.lehr.be
2. **IEA SHC Task 37:** Advanced Housing Renovation with Solar and Conservation: www.iea-shc.org/task37
3. **SuccessFamilies:** Piloting models for holistic renovation of single family houses. <http://successfamilies.vtt.fi/>

These studies investigated the diffusion of highly energy-efficient solutions and technologies in the retrofit market, using an integrated whole-building approach. The studies focused on exemplary house renovation projects that achieved substantial primary energy savings while

providing good comfort conditions. Energy performance and motivation for the renovation were important considerations.

The project “**Low Energy Housing Retrofit - LEHR**” (Mlecnik et al., 2010) found a high potential for energy economy when renovating buildings in Belgium, with substantial energy savings possible for most house typologies. The reduction of transmission and ventilation losses, the use of passive and active solar energy, efficient energy supply and overheating control were defined as success factors from demonstration projects.

The innovations identified were classified according to innovative solutions for thermal insulation (roofs, floors, walls, thermal bridges), for improving building air tightness, for efficient ventilation systems using heat recovery (in ventilation or heat production), for the use of solar appliances (renewable energy, shading), and for passive cooling strategies. (Mlecnik et al., 2010).

From this research it was concluded that, in order to go from demonstration project to wider introduction of innovative technologies into the single-family housing renovation market, the house-owners can be engaged in very low energy housing retrofit when SME’s include the following issues in their innovation development:

- More (relative) advantage: solutions and innovations that are perceived better than existing alternatives (for example providing improved quality and energy performance)
- Improved compatibility: innovations should be consistent with the existing values, past experiences and real needs of house-owners (for example the perceived need for space extension, protection, less burden, comfort, health or quality improvement)
- Low complexity: innovations should be easy to use or understand
- Good demonstrability: showing real experiences considering experimentation with innovations (for example in demonstration projects)
- Better visibility: marketing should target visibility and recognition of the innovation and/in the projects (the system should allow for better visibility of actors involved in quality demonstration projects).

However, the following research question was left unanswered:

What can we learn from technology innovation clustering initiatives, in order to facilitate the further diffusion of innovations for highly energy-efficient renovation? It is this question that was taken up for further research in this paper.

Secondly, the **IEA-SHC Task 37**: “Advanced Housing Renovation with Solar and Conservation” offered another research-based source of inspiration. For example, the Subtask A on marketing and the Subtask B on demonstration projects provided the international reference documents “From Demonstration to Volume Market - market development for advanced housing renovation” (Rødsjø A., et al., 2010) and “Lessons from Exemplary Housing Renovations” (Hastings et al., 2010).

In “From Demonstration to Volume Market” the importance of collaboration with different actors in different innovation phases (introduction, market growth, volume market) was discussed and the creation of a “one stop shop” idea for holistic renovation of single-family houses was recommended.

Last but not least, the on-going project within the Nordic Region called “Success Families” (www.successfamilies.vtt.fi), offers basis for further exploration on pilot models for holistic renovation of single-family houses.

Having this as research background the goals of an ERANET-ERACOBUILD project “Sustainable Construction”, were formulated as combining actions on the supply and the demand side:

Supply side

- Develop solutions (companies) for holistic very low energy renovation of single-family houses.

Demand side

- Less effort for the house owners: Make “shopping” and execution of renovation available and with quality assurance.

The following partners joined their expertise and experience in working on the “One stop shop” project (September 2010-August 2012):

- PHP, Flemish Passive House Platform (Coordinator)
- Segel AS, Norwegian consulting company
- DTU, Technical University of Denmark
- VTT, Technical Research Centre of Finland
- BBRI (WTCB), Belgian Building Research Institute
- VCB, Flemish Construction Federation (key organisation for a Flemish Case Study).

3 Research Methodology

The project partners in Belgium, together with the Flemish Construction Federation (VCB) surveyed the construction companies to find out whether and how construction enterprises are willing to cooperate for holistic renovation.

A questionnaire was developed and sent to members of VCB, PHP and BBRI (WTCB). Since VCB has a long history of surveys amongst their members, they were the preferred partner to set up the questionnaire. The survey was circulated through a specific web site (www.one-stop-shop-renovatie.be). Each of the above organisations distributed a link to the survey in two rounds. A first round was done in December 2010, a reminder was sent in January 2011.

Of the 3812 recipients, we received a total of 139 completed surveys, or a response rate of 3.65%.

In order to get a good insight on the companies' willingness, different questions were asked:

- What are their business characteristics?
- What is their offer on the renovation market?
- What is their demand on the renovation market?
- Which company is looking for expertise?
- Which company offers expertise?
- How can knowledge be transferred?

At the end of the survey the respondents could choose whether they wanted to leave their address for information. This allowed defining a first pool of contractors interested in the further development of the project.

4 Analysis

4.1 Business Characteristics

About 20% of 139 respondents stated that they had no employees at all (see Figure 1). About 49% indicated to have between 1 and 5 employees. As such, we obviously observed that most respondents are smaller companies. This reflects the full population of all companies: the (Belgian) renovation sector is dominated by micro-enterprises. Almost all of them (95%) are active in the housing market, but also, almost all companies are active in multiple market segments. On the question in which sector they are active (houses; apartments; offices; education, health, sport; companies; development projects), on average, the respondents claimed to be active in at least three of the six possible markets (see Figure 2).

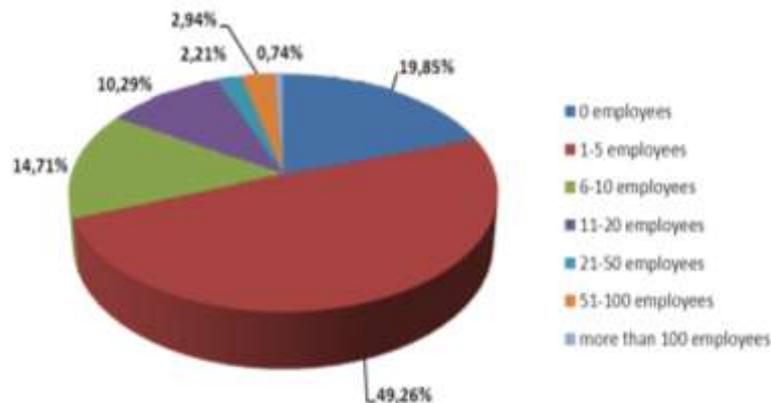


Figure 1: Respondents and number of employees

When asking what their main area of activity is, 29% stated to be active in “finishing” works (painting, flooring ...) and 29% to be active in “installations” (heating, plumbing). When going more in detail, within “finishing” the respondents mainly chose for insulation, ceilings and internal walls. Within “installations” heating, ventilation and plumbing were picked as the main activities. On average, a company denoted five choices. The results show the importance of concentrating on companies that are active in the finishing and/or technical issues within the housing market.

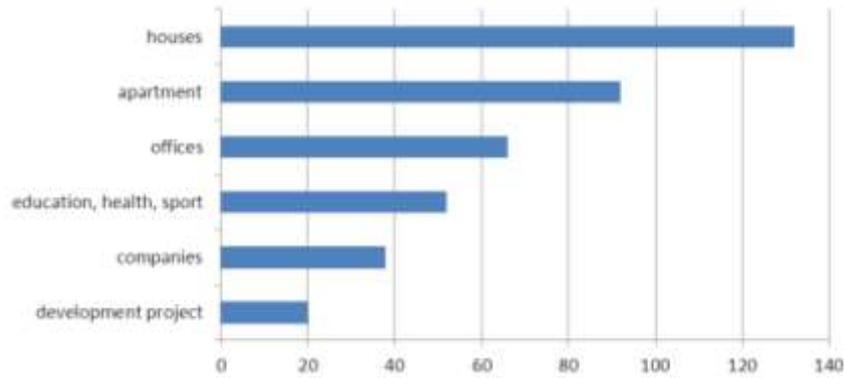


Figure 2: Division by sector (number of respondents, multiple sectors possible)

4.2 Offer for very energy-efficient renovation

When asking the respondents on their offer for very energy-efficient renovations, only one third claimed to have a frequently used offer for highly energy-efficient renovation, another third stated that they are still in an exploring stage. Of the 37 companies who indicated to have a frequently used very energy-efficient offer, 10 of them stated to take up whole buildings and 13 to take care of complete renovations of installations. When we asked the respondents about their expected turnover they made clear to expect a large increase in this market within the next 5 years. However, at the moment, the share of such renovations within the company's turnover is still small to average, but, as shown in Figure 3, this is expected to rise to a significant share at short rate.

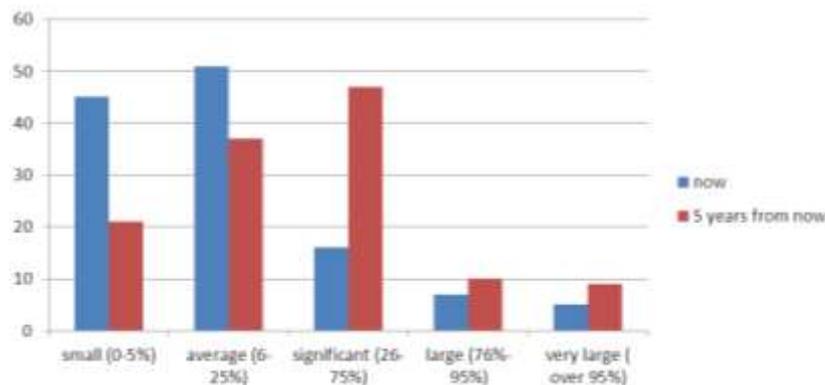


Figure 3: Present and expected turnover share of highly energy-efficient renovations (number of respondents).

The questionnaire results reflect the need for SME guidance in this transition. Holistic renovation requires coordinated cooperation between companies, and attracting new knowledge and/or complementary actors. Therefore it is interesting to know whether companies themselves are open to cooperation and if so, who exactly they would prefer to team up with. This is addressed in the following paragraph.

4.3 Looking for expertise

On the question with whom they would like to collaborate, and share experience, Table 1 shows the trends. In every sector there is a large share that is not interested in collaboration. Those who wish to cooperate prefer to have an alliance with another company in the same

sector. More technical oriented companies are most willing to cooperate. Only 17% of them show no interest whereas 83% would like to join hands. Companies that are already renovating full buildings have least interest. Interestingly, all groups of companies mark as second choice for collaboration (outside their own sector) the cooperation with a designer. When asked what specific designer they wanted to collaborate with, most votes went to the architect (54%). Another 32% opted for a guiding engineer.

Table 1: Preferred collaboration between actor types (frequencies)

company/alliance	building skin	installation	finishing	design	not interested
building skin	26,32%	10,53%	10,53%	26,32%	26,32%
technical	11,11%	41,67%	2,78%	27,78%	16,67%
finishing	5,88%	11,76%	44,12%	17,65%	20,59%
full buildings	8,33%	8,33%	25,00%	25,00%	33,33%
others	10,00%	20,00%	20,00%	30,00%	20,00%

It can be speculated that companies are looking for a coordinator to supervise the whole project, some kind of superintendent that takes up responsibility for the whole building renovation. For example, with the presence of an architect, responsibility can be shifted. Another reason might be the lack of knowledge: this is further explored in the following paragraph.

4.4 How can knowledge be exchanged?

Alliances appear to be needed to eliminate fragmentation and share responsibility in the renovation process. These should be organized in a clear, efficient and transparent way for each partner. However, when collaboration is addressed, it is important to also think on how an exchange of knowledge can be set up. If the exchange of knowledge is not well defined in the alliance, the actor collaboration in the alliance could be counterproductive and, eventually, even lead to insufficient renovation quality or breaking of the alliance..

When analysing the viewpoint of the respondents on preferred communication channels of sharing knowledge it became clear that they choose the organisation of workshops and seminars (see Figure 4). About 70% see this as the best way, followed by the transfer of knowledge through a website (47.24%).

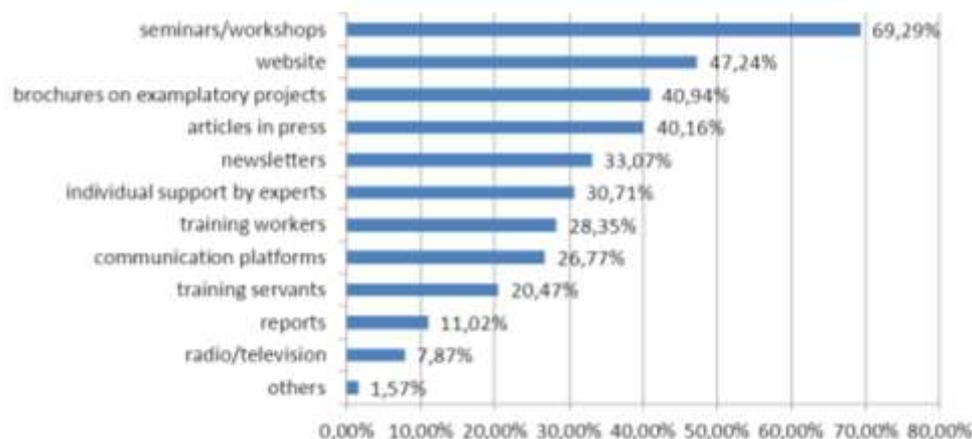


Figure 4: how do respondents want to share knowledge

4.5 Focus

One of the last questions we asked the respondents was where our focus should be in facilitating holistic energy-efficient renovations (see Figure 5). The largest part of respondents (80%) noted that success or failure of such project is subject to the awareness of consumers. The customers have to know that project exists and have to be aware of the added value. In this framework, most companies also indicate the need for grants. Also, improving awareness of companies was indicated as an important focus by the majority of respondents.

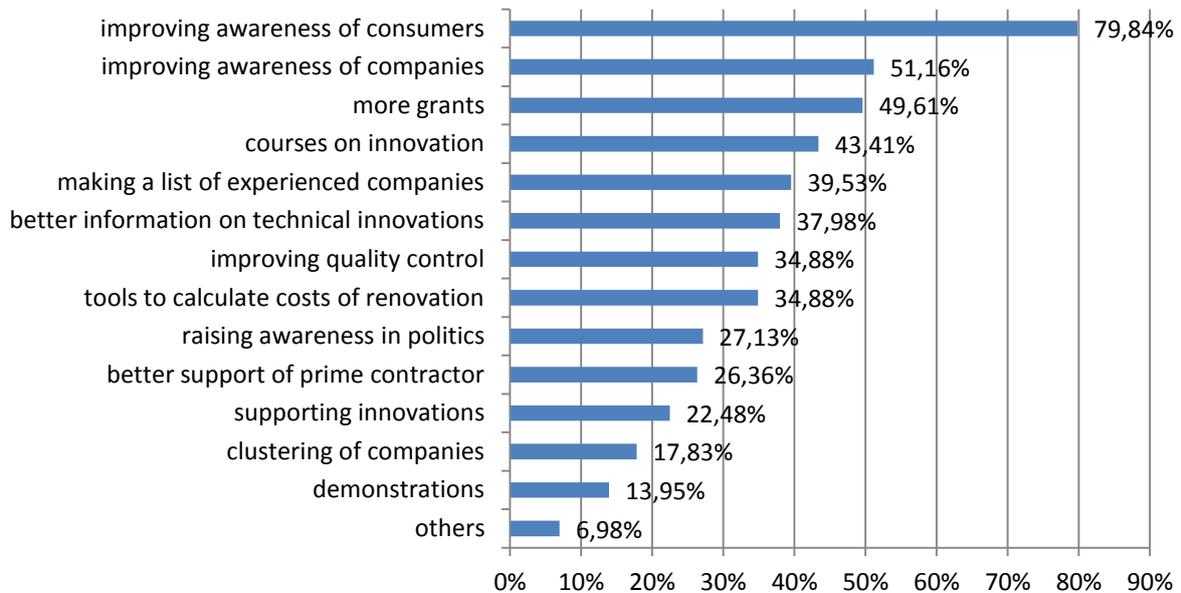


Figure 5: What focus do we need to develop?

It can be speculated, whether the respondents are already envisioning real, physical clustering, since they indicated to have more interests in awareness raising and meeting moments in which they can gain expertise and experiences.

The research results finally led to the recommendation to investigate opportunities for web sites in order to facilitate the market development of holistic renovation. On the one hand, such web site would allow developing a virtual platform where different contractors can meet each other and exchange ideas and experiences with innovations, techniques and methods, notably in demonstration projects. Also, ideas can be provided about physical clustering and business development. On the other hand, it can serve as a portal to organise physical meeting moments and listing of experienced actors.

5 Conclusion and Further Research

From the survey we did among the Flemish (Belgian) construction sector we can conclude the following:

- Currently, the turnover of the energy-efficient offer is still a minor part of the total turnover, but within 5 years a significant increase is expected.
- A large percentage of micro-companies exist, wishing to cooperate with other companies, with strong preference for collaboration with architects or engineers.
- Nowadays SME's in the renovation sector are mostly active in different market segments.

- Currently, the organisation of workshops and seminars is seen as the best way to facilitate the exchange of knowledge. A website is seen as an opportunity to share knowledge.

Based on these conclusions the following actions for further work in the “one stop shop” project were distilled.

5.1 The organisation of know-how transfer to increase sustainable renovations

Based on the results of the survey and results of previous research (Mlecnik et al., 2010) it can be concluded that the knowledge on innovative solutions and methods is not widespread. Currently, companies offering holistic very energy-efficient renovations as a package, or companies involved in demonstration projects, can be seen as frontrunners. While whole house provider show less motivation for collaboration – maybe because they are used to organize knowledge exchange within their company -, the need for knowledge exchange is high for micro-enterprises.

To optimise the renovation process beyond current fragmentation it is important to facilitate knowledge transfer between SME's. In the “one stop shop” project, this work is done by mapping the attention points and interactions between the different professionals in a single-family renovation project (Vrijders et al., 2011). A list of “potential problems” was created. By calling the problems “by name” they become more debatable, and clear agreements on responsibilities and ways of execution can be made (Vrijders et al., 2011). To list problems, solutions and agreed responsibilities, a matrix approach was developed. Issues will now be discussed in practical workshops and the results will be implemented in a web tool using a graphical house interface.

Another important aspect is the development or implementation of new, innovative solutions for some of the potential interactions. More and more European product developers and manufacturers come up with new solutions in order to improve the current building and renovation practice. This can be in terms of improving performance of the products or creating totally new solutions. So far, the “one stop shop” project resulted in a compilation of available innovations in – for companies easy to understand - two page leaflets. In the view of this work; more interesting might be the integrated product” solutions that allow for execution of different tasks at once (Vrijders et al., 2011).

5.2 The development of a website to facilitate transfer of knowledge, conceptualized as a platform where demand and supply side can interact.

From the survey we concluded that respondents see a website as an important tool to transfer knowledge. Such a website could also serve as a portal to generate demand and bring customers in contact with the (knowledge provided by the) supply side.

In the “one stop shop” project we analysed about 20 web sites from different countries – that try to integrate supply and demand side for energy renovations - which we believe to have the potential to develop towards full “one stop shop” web sites (Mlecnik et al., 2011). The researchers focussed on comparing web sites from different European countries that (partially) offer an integrated demand/supply interface for holistic house renovation. Weaknesses were discussed and strengths were combined in order to find an “ideal” model for a web site. Within the “one stop shop” project, we want to go beyond the simple listing of all possible companies. We want to stress the innovations, use information from quality

demonstration projects, and assemble expertise of companies who perform energy efficient renovations. This adds value for companies involved as well.

Also, a specific focus should be set on the integration of the customer. A research model was developed to examine how a “one stop shop” tool could address each step in the whole innovation-decision process from the viewpoint of the customer (Mlecnik et al, 2011).

This research concluded that a web tool for steering decisions to implement thorough renovation should be based on subsequent levels of needed information: knowledge, persuasion, decision, implementation, confirmation. Four knowledge levels are important: (missing) conceptual information on integrated energy renovation, knowledge about demonstration projects, information about innovative technologies, and continued integration of customer and supplier experience (Mlecnik et al., 2011).

Within the continuation of the “one stop shop” project a pilot project of a web tool based on the supply-demand interaction model will be set-up and tested.

5.3 The development of new business models to help companies active in the field of very energy-efficient renovations to establish an integrated offer

When we asked the respondents in what sector of the renovation process they were active it became clear that most companies are active in different sectors. This indicates that, because these companies have a specialized offer, they need to accept jobs in different types of buildings. However, the research in the “one stop shop” project suggested a building typology approach (Cré et al., 2011). So companies are expected to specialize in whole house offer for specific building typologies. They also indicated that they wish to cooperate with other companies. These considerations are a good starting point to investigate eliminating the barrier of a fragmented renovation offer for single-family houses.

Rødsjo et al. (2010) highlighted that there is a missing link between the single-family house owner and various integrated offers of single solutions for renovation and/or energy-efficiency installations. As a holistic energy-efficient renovation project is a “new” and unknown service to single-family house owners and at the same time a costly investment, it is important for the suppliers to find adequate ways of communicating through all phases of the buying process. There are various challenges in each of the phases which have to be solved differently (Haavik et al., 2011).

In the framework of the “one stop shop” project the competitive arena of a few newly established or potential new business models for holistic renovation of single-family houses have been studied (Haavik et al, 2011). The researchers used the six-forces model of Grove (1996) to identify opportunities and threats for each pilot studied. For renovation of single-family houses this exercise was presented in a paper to SB10 in Helsinki in 2010 (Haavik et al, 2010). This work will now be continued for different case studies in different countries and (intermediate) ideas for new businesses will be presented in a business-to-business event, schedule 19 April 2012 in Antwerpen.

The “one stop shop” project will end August 2012. All reports will be available on www.one-stop-shop.org.

6 Acknowledgement

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