



## **ERA-NET Eracobuild project**

**One Stop Shop - “From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation”**

**(1<sup>st</sup> September 2010 - 31<sup>st</sup> August 2012)**

### **Project Report WP 3.1**

**Methodology for innovations in supply side for sustainable renovation**

#### **Executive Summary**

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## Abstract

There is a huge theoretical potential for reducing the energy consumed in existing single-family houses by means of highly energy-efficient integrated renovation. For successful market development of such renovations, supply chain collaboration is very important, while at the same time customer demand for integrated renovations has to be stimulated.

In this research report - produced in the framework of the ERA-NET Eracobuild project *“One Stop Shop - From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation”* Work Package 3.1 - supply side needs of architects and contractors for developing highly energy-efficient integrated housing renovation were detected from interviews with demonstration project stakeholders and from a contractor questionnaire. These research results contributed to defining opportunities and barriers related to process innovation to unburden the client and to achieve less fragmented single-family housing renovation processes.

Based on the results of the interviews and questionnaire, practice-oriented research further developed ideas and a methodology to increase adoption of innovation, by improving (web-based) communication between various renovation market players and homeowners. The research analysed strengths and weaknesses of existing web-based portals that offer a connection between suppliers and homeowners related to five steps in the homeowner’s decision processes. These research results led to proposing a methodology to stimulate innovation in supply side: a model for the development of a One Stop Shop web portal for integrated housing renovation.

The research results and the developed methodology were used for reflection in Belgium, Denmark, Finland and Norway. Specifically, in the implementation phase of ‘Innovation in supply side collaboration’ the results led to defining a new networking methodology for stimulating business collaboration (see WP3.2 report). Furthermore, the methodology was used for the development of a One Stop Shop web portal flow chart that reflects homeowners’ decision processes (see WP5 report). Also, the methodology provided inspiration for developing Guidelines to One Stop Shop pilot (see WP4 report).

## 1. Introduction

Today’s new-built housing market focuses on higher energy performances. While a market niche emerges for highly energy-efficient new-built houses – such as Passive Houses -, improving the existing building stock appears to be more difficult. For renovations to remain competitive with future new-built houses, the awareness grows that renovations will need to develop beyond the implementation of single energy-saving measures towards integrated energy renovations. There is a huge theoretical potential for reducing the energy consumed in the existing building stock, especially when high energy efficiency in individual integrated renovation is targeted.

But how do we get from demonstration projects to a volume market for such energy renovations? While previous research – for example international energy research supported by the International Energy

Agency<sup>1</sup> - provided useful reflections and defined key actors, innovation phases and exemplary processes, an important challenge remains to shape (regional) integrated supply and customer demand to effectively increase the number of such renovations taking place. For successful market development, it will be necessary that different actors cooperate to stimulate supply and demand.

To accelerate the market development for advanced housing renovation, a methodology for innovations in supply side was developed in the international research project *“One Stop Shop. From demonstration projects towards volume market: Innovations for sustainable renovation”* that was set up under the European ERA-NET Eracobuild program, involving researchers from Belgium, Denmark, Finland, and Norway. The overall aim of this *“One Stop Shop”* project was to facilitate market development of (mainly owner-occupied) whole house renovations. The project focused on renovating single-family houses to very high energy standard while providing superior comfort and sustainability to occupants.

## 2. Research approach

The essence of the diffusion process of innovation is information exchange<sup>2</sup>. Therefore it is useful to study communication channels such as web platforms, which can be the means by which messages get from one individual to another, from suppliers to homeowners and vice versa. Our research focused on developing improved communication in order to achieve the higher standard of integrated energy renovations and to adopt the technological innovations in daily practice. We focused on developing and testing a methodology for the integration of innovation and the stimulation of collaboration between various market players, particularly SMEs (Small and Medium-sized Enterprises), taking into account possibilities for developing new web-based portals. We aimed to develop a methodology that would stimulate sectorial innovation and the development of supply side collaboration, and that would also lead to unburdening the homeowner and to achieving less fragmented single-family housing renovation processes. The development of this methodology was supported by two practice-oriented studies, as explained below.

The first study specifically aimed to detect key concerns from the supply side, particularly contractors and architects, regarding the need for a One Stop Shop for single-family housing renovation. Experiences from demonstration projects were collected during interviews with key stakeholders and a questionnaire was sent to contractors, turnkey suppliers and other relevant others via federations and knowledge centres. The results were used as input for a second study on existing web-based portals. We investigated how portals currently promote integrated housing renovation and how the portals link innovations in supply side with potential customers. This study led to analysing strengths and weaknesses of different existing web portals. The results of both studies led to proposing a methodology for developing a new web-based portal. Such a new portal could integrate innovation for integrated housing renovation; stimulate supply side collaboration; and better link suppliers with customers. A web tool model (with focus on better reaching homeowners), was then developed as result of this methodology<sup>3</sup>.

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<sup>1</sup> For example:

IEA SHC Task 28: Sustainable Solar Housing; <http://www.iea-shc.org/task28/>

IEA SHC Task 37: Advanced Housing Renovation with Solar and Conservation; <http://www.iea-shc.org/task37/>

<sup>2</sup> See for example: E.M. Rogers, *Diffusion of innovations*, fifth edition, Free Press, New York, 2003.

<sup>3</sup> See Work Package 5 report

### 3. Key concerns from the supply side

A first study examined the key concerns and existing opportunities from the supply side. This was done using two parallel approaches. On the one hand, the experiences from exemplary projects<sup>4</sup> – specifically in the field of highly energy-efficient single-family home renovations - were used to find difficulties and bottlenecks in real examples. On the other hand, a questionnaire was used to register the ideas of key market players, such as contractors, even those without actual experience on very ambitious projects. This research was initially done in Belgium. A questionnaire was developed by the Flemish Passive House Platform (PHP) in collaboration with the Flemish Contractor Federation (VCB) and implemented on a web site. PHP, VCB and the Belgian Building Research Institute (WTCB) distributed a link to the web survey in two rounds to their members. 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%. The results were then presented for discussion and reflection to the Norwegian, Finnish and Danish partners, who also collected experiences from demonstration projects and market development in their countries. The detailed research results have been described in separate papers (see references at the end of this section). Here we present the main findings from this part of the research.

#### 3.1 Experiences from demonstration projects

The research helped in defining the innovations related to highly energy-efficient integrated housing renovation<sup>5</sup>. Besides several technological innovations, we also found system, service and concept innovations, such as Passive House renovations. The systemic use of innovative whole building concepts was found useful, since this can lead to well-coordinated renovation modules with fewer companies involved.

Enterprises such as architects and contractors found difficulty in adopting some of these innovations. Often these problems could be related to lack of collaboration between market actors. The following issues were perceived as particularly problematic, requiring process solutions where another actor might play a role:

- Many traditional craftsmen are unfamiliar with the innovations;
- Many craftsmen are not used to work together on whole building solutions;
- Many craftsmen are involved, often resulting in problematic coordination on site which can result in lower quality;
- Disturbance and required effort of the occupants and owners should be reduced.

To overcome these socio-technical barriers, an option is to lift up the level of knowledge of the craftsmen. Steered by client motivation architects often appeared to be social innovators in the demonstration projects, involving clients, new suppliers and motivated contractors in the design process to adopt suitable innovations. Some service providers and technological solutions were found to provide good opportunities to increase customer confidence for integrated renovation, for example by increasing construction speed,

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<sup>4</sup> Based on the projects studied in the project 'Low Energy Housing Retrofit – LEHR', selected demonstration projects from International Energy Agency research (IEA SHC Task 37), the projects described in the Work Package 1 report and additional case descriptions (WP3 separate report).

<sup>5</sup> See also Work Package 1 report: catalogue of innovative products and systems

minimizing hindrance, providing energy performance guarantee or by facilitating the overall renovation process, e.g. by providing one key responsible for the whole renovation. The need for a service innovation was found to be important for the adoption of technological innovation. This need was defined as involving an additional actor who provides reliable information, who coordinates, and who has know-how on how to integrate innovative technologies, in order to reduce the burden before and during the renovation. The proposition was formulated that a sole responsible is needed for a “One Stop Shop” solution<sup>6</sup>.

More information:

Mlecnik E., Cré J., Kondratenko I., Hilderson W. (2011) **Innovations in Very Low Energy Retrofit Projects - Experience of Belgian exemplary projects** In: Conference Proceedings of PLEA2011, Louvain-la-Neuve, Belgium; 2011.

Mlecnik E. (2012) **Project Report WP 3.1 Methodology for innovations in supply side for sustainable renovation: Additional case descriptions**, Available on-line: <http://www.one-stop-shop.org>.

### 3.2 Questionnaire results

Most respondents were smaller companies<sup>7</sup>. This reflects the full population of all companies: the (Belgian) renovation sector is dominated by micro-enterprises. Almost all of them (95%) were active in the housing market. Many companies were active in the finishing and/or technical issues within the housing market<sup>8</sup>.

About one third of the enterprises that responded to the questionnaire claimed to already have a frequently used offer of highly energy-efficient renovations. The share of such renovations within companies' turnover is still small to average. Respondents stated they expect a large increase in this market within the next five years. Enterprises appear to be most willing to cooperate with a company within the same sector. Sharing ideas or joining teams with companies in other branches only comes in second place<sup>9</sup>. Companies already renovating full buildings were found to have least interest in collaboration<sup>10</sup>.

The client (the demand side) has to be reached with information. This was perceived by the supply side as a most important barrier (see Figure 1: questionnaire results). The research results showed strong preference of enterprises for awareness rising, both within the supply side and towards the demand side. They also

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<sup>6</sup> This proposition was reflected on practice in Work Package 3.2

<sup>7</sup> About 20% of 139 respondents stated that they had no employees at all. About 49% indicated to have between 1 and 5 employees.

<sup>8</sup> 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.

<sup>9</sup> For Flanders it was found that most professionals prefer designers, architects or guiding engineers as a secondary option for collaboration. This might be different in other countries and regions where for example the profession of architect is not protected by law.

<sup>10</sup> A general contractor might be more experienced in different activities and better placed to take up own coordination, which can result in lower demand for cooperation with other enterprises.

highly valued more grants for highly energy-efficient renovation, courses and better technical information on innovation and making a list of experienced companies<sup>11</sup>.

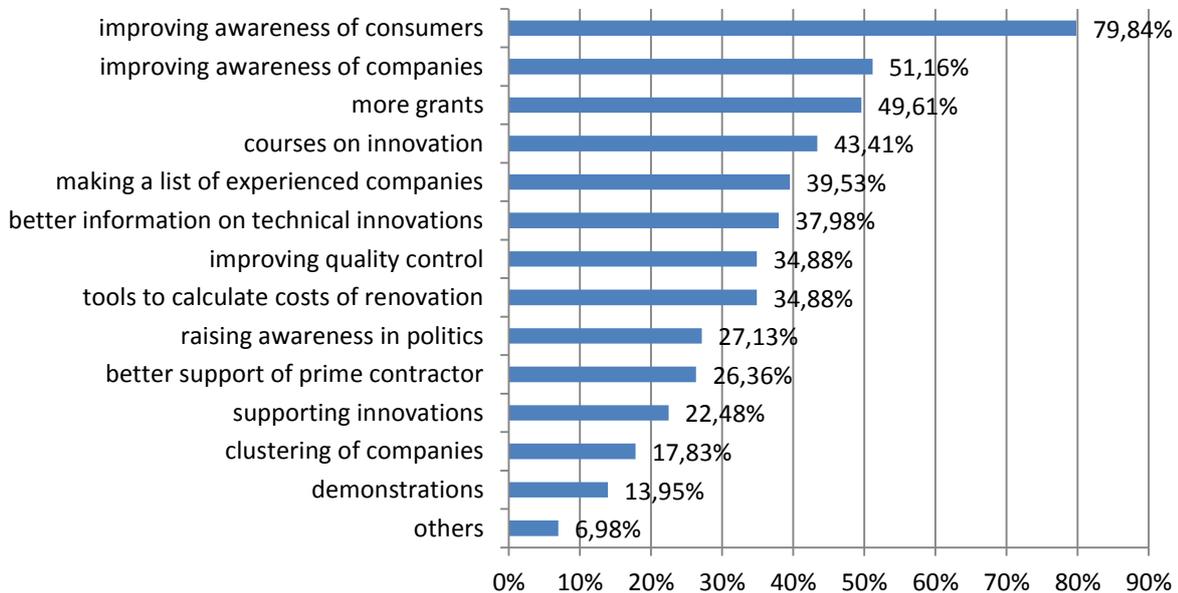


Figure 1: What focus do supply side enterprises expect regarding the market development of integrated housing renovation? (139 respondents; Belgium)

This led to the identification of an important need for knowledge transfer events and tools. Since the One Stop Shop project started from the premise of a ‘web platform’, it is important that the following aspects are incorporated in the platform. Such website must connect both sides (supply and demand) to avoid the situation “if there is no demand there is no supply”. All innovations and possible techniques could be assembled on a web site, while coupling seminars and workshops, project brochures, listing of market players, and so on. Very high importance was noted of linking this web site with the demand side.

More information:

Cré J., Mlecnik E., Kondratenko I., De Graeve P., van der Have J.A., Vrijders J., Van Dessel J., Haavik T., Aabrekk S.A., Paiho S., Stenlund O., Svendsen S., Vanhoutteghem L., Hansen S. (2012) **Developing an integrated offer for Sustainable Renovations** Paper presented at the Retrofit 2012 conference, Manchester, UK.

Mlecnik E., De Kimpe F, De Graeve P., Vrijders J. (2012) **Project Report WP 3.1 Methodology for innovations in supply side for sustainable renovation: Questionnaire**, Available on-line: <http://www.one-stop-shop.org>.

<sup>11</sup> Better technical information was developed in Work Package 1 which contributed to defining content for a course in Flanders. A list of market actors was established in Work Package 3.2. The low rating in Figure 1 for ‘clustering’ might be due to unfamiliarity of the companies with this term.

## 4. Research on web-based portals

Following up on the results of the questionnaire, we looked more into detail on how a website for knowledge transfer between the supply side and the demand side could look. We investigated twenty already existing web platforms from seven countries with the goal to provide a better understanding on how clients' innovation-decisions can be steered. In this research we focused on using research methods regarding the diffusion of innovations<sup>12</sup>. This research was presented in a separate paper and report (see references at the end of this report). Some of the detected opportunities are presented below.

The use of innovation-decision models can significantly contribute to a better understanding of what drives decision processes in both customers and SMEs to adopt innovation and how this relates to possible solutions in order to increase the uptake of highly energy-efficient renovation. Communication channels such as web-based portals can influence each step of the decision-process: from first knowledge of an innovation, to forming an attitude towards the innovation, to a decision to adopt or reject, to an implementation of the new idea, and to a confirmation of this decision. In each step of the decision process potential adopters can decide to quit adopting the innovation, so communication channels need to provide the right information in each step and guide the potential adopter through the whole process.

From comparing existing web sites we detected that different actors could lead One Stop Shop market development: public actors, vendors, consumer organizations, non-profit organizations, architect organizations, contractor federations, and so on. The richness of the existing web sites was found to vary from simple text communication and selection tools to multi-level interfaces or user toolkits where the customer can influence the final product or simulate the desired outcome.

Based on these research results, Erwin Mlecnik<sup>13</sup> created a list of questions that clients would expect to be solved from a web platform, in order to guide them from each decision level to the next:

- What is integrated (sustainable/deep) renovation?
- What are available solutions? (concepts, technologies, innovation)
- Why should I take the step to integrated renovation? (long-term saving, ecological motivation, energy saving, avoiding future works or long-term renovation, combining different grants and tax benefits, and so on)
- Why should I choose integrated renovation compared to what I had in mind? (awareness raising based on own situation: kitchen/bathroom renovation, wish for extension, improvement of comfort or air quality of certain rooms, improving degrading roof or façade,..)
- What are experiences from other clients that chose integrated renovation? (process, actors, cost-benefit, achieved quality)
- Where can I ask for offers? (suppliers, financing, consultants)
- How can I compare, choose, reject offers? For example, what needs to be specified in a contract proposal?
- How should I plan the intervention of actors?
- What questions do I have to ask during the works to check the quality?

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<sup>12</sup> This was based on the work of E.M. Rogers (Diffusion of innovations. 5th ed. New York: Simon and Schuster; 2003)

<sup>13</sup> Revised by the One Stop Shop partners

- How do I get a guarantee/ recognition/ label of good execution/ energy performance?
- How can I express positive/negative experiences?

No existing web platform was found that provided an answer to all these questions. If the customer does not find an answer to some question, the decision-process to adopt integrated renovation might be interrupted. Most examined web platforms also showed severe weaknesses for providing information on integrated renovation or technological innovations.

More information:

Mlecnik E., Paiho S., Cré J., Kondratenko I., Stenlund O., Vrijders J., Haavik T., Aabrekk S.A., Vanhoutteghem L., Hansen S. (2011) **Web Platforms Integrating Supply and Demand for Energy Renovations** In: Conference Proceedings of Passivhus Norden 2011, Helsinki, VTT, Finland.

Mlecnik E., Paiho S., Vrijders J., Haavik T., Vanhoutteghem L.. (2012) **Project Report WP 3.1 Methodology for innovations in supply side for sustainable renovation Addendum 2: Research on web-based portals: Country Reports**, Available on-line: <http://www.one-stop-shop.org>.

## 5. Proposed methodology

Current fragmentation – different SMEs doing fractions of a supposedly integrated renovation –, cost management, lack of knowledge and lack of project management are very important barriers for advanced energy renovation of single-family housing. However, many companies are willing 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 and more targeted. A ‘One Stop Shop’ web portal could both inform actors, as well as unburden the client.

To stimulate innovation in supply side, supply chain collaboration and end-user adoption of innovation, we suggest developing a web portal for the promotion of integrated renovation. This web portal should target four groups of actors: mediators, consultants, contractors and technology suppliers. The development of this portal can be based on the five consecutive steps in innovation-decision processes (information, persuasion, decision, implementation, confirmation). Such a web portal development should pay careful attention to:

- Developing socio-technical innovation in the supply side
- Realizing customer awareness for integrated renovation
- Using demonstration projects as trusted sources
- Including training of professionals
- Guiding customers step-by-step to integrated renovation
- Stimulating supply chain collaboration
- Providing independent neutral information
- Closing the information loop, including customer feedback and quality assurance

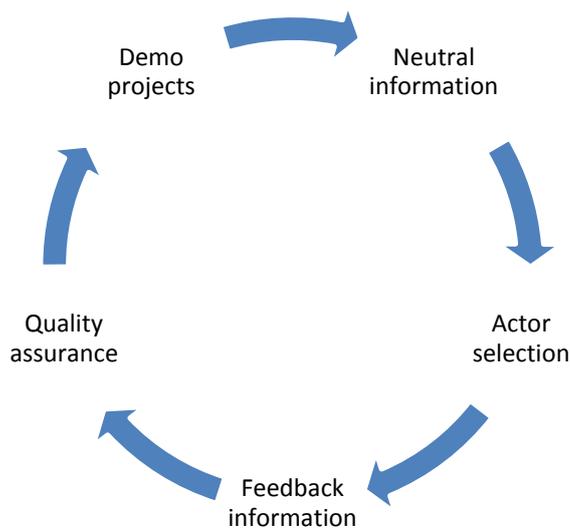


Figure 2: Proposed methodology to stimulate innovation in supply side: model for development of a One Stop Shop web portal for integrated housing renovation.

More information:

Mlecnik E., Kondratenko I., Vrijders J., De Graeve P., van der Have J.A., Haavik T., Aabrekk S.A., Grøn M., Hansen S., Svendsen S., Stenlund O., Paiho S. (2012) **Collaboration opportunities for advanced housing renovation** Paper and poster presented for the IEA SHC Conference 2012, San Francisco, USA; 9-11 July 2012; paper to be published in Energy Procedia, Elsevier.

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