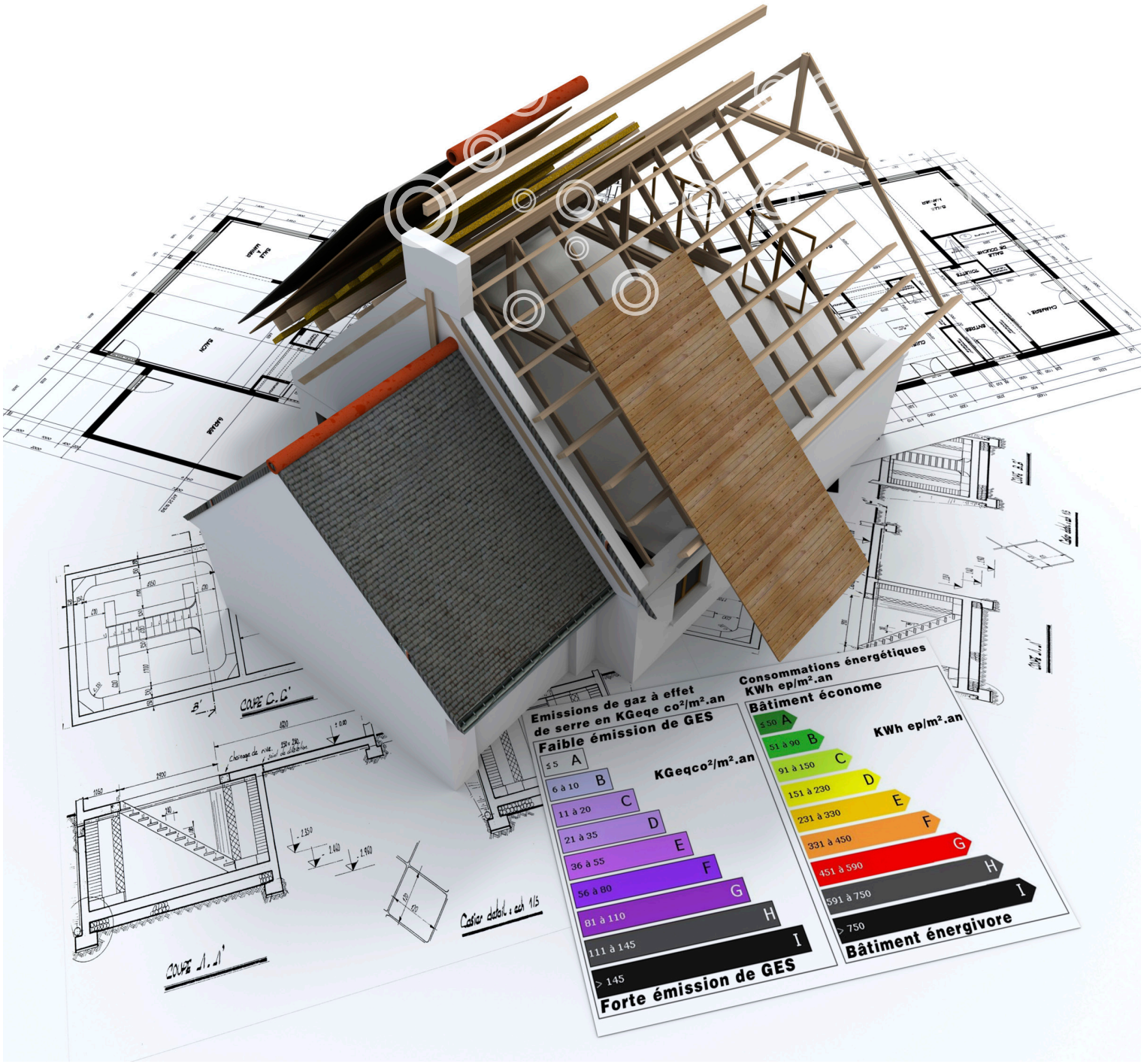
NORDIC INNOVATION REPORT 2013 // AUG 2013

One Stop Shop

- "From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation"



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- "From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation"

Acknowledgements:
Funding for this research was obtained within the ERANET Eracobuild. The Flemish partners were funded by IWT, the agency for innovation by science and technology of the Flemish Community. The Norwegian and Danish partners were funded by Nordic Innovation. The Finnish partner was funded by Tekes - the Finnish Funding Agency for Technology and Innovation, the Technical Research Centre of Finland (VTT).

October 2012

One Stop Shop

Nordic Innovation Publication

(URL: http://www.nordicinnovation.org/publications)

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www.nordicinnovation.org/publications
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Participants

PHP, Passiefhuis-Platform, Belgium, non-profit organization. www.passiefhuisplatform.be

BBRI, Belgian Building Research Institute, private research institute. www.bbri.be

Segel AS, Norway, consulting company. www.segel.no

DTU, Building Physics and Services, Denmark, DTU Civil Engineering. www.dtu.dk

VTT, Finland VTT Technical Research Centre of Finland. www.vtt.fi

VCB, Vlaamse Confederatie Bouw, Belgium (Flanders), federations of constructors. Partner for the Flemish case-study. www.vcb.be

Preface

The report covers activities undertaken by the consortium of partners in the Eracobuild project: One Stop Shop - "From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation" including results achieved by the project partners in all Work Packages of the work programme. Since financing of partners is by different funding agencies and they follow financial reporting obligations required by corresponding funders (i.e. IWT in Flanders for partners: Passiefhuis-Platform vzw and BBRI; Tekes, Finland for VTT, and NIC for Segel, Norway and DTU, Denmark), the financial reporting is not included in this report.

All publications and deliverables are made publicly available from the project website:
http://www.one-stop-shop.org

Executive summary

Objective

The overall project objective 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.

This objective will be reached by the following goals:

- Clustering Innovative Technologies to reduce fragmentation of the renovation process, specifically for SMEs to increase their knowledge, skills, capacity and competitiveness in offering holistic and cost effective renovation solutions.
- Development of one stop shop (tool) for sustainable renovation as platform for house owners (in support to their well informed investment decisions, easy access to renovation contractors with high quality whole building solutions house renovation), and companies in offering holistic renovation solutions.
- Communicate and disseminate project results to target audience of key actors (especially SMEs) in advanced residential building renovations in all participating countries/regions and wider in Europe.

The work plan was organized in the following 7 Work Packages:

WP1 Innovative Technologies, Methods, Techniques, Whole Building Solutions and Policies in Sustainable Renovation (WP Leader: BBRI, Belgium)

WP2 Optimal renovation strategies from environmental and economical viewpoint (WP Leader: BBRI, Belgium)

WP3 Innovations in Supply Side for Sustainable Renovation (WP Leader: PHP, Belgium)

WP4 Development of "White Book" for establishment of one stop shop and testing of different concepts through pilots (WP Leader: Segel, Norway)

WP5 Development of One Stop Shop Tool in Sustainable Renovation (WP Leader: VTT, Finland)

WP6 Dissemination and Communication (WP Leader: PHP, Belgium)

WP7 Project management (WP Leader: PHP, Belgium).

Contents

WP1 Innovative Technologies, Methods, Techniques, Whole Building Solutions and Policies in Sustainable Renovation

WP Leader: BBRI, Belgium

Report: *"State-of-the-art in housing renovation: building typologies, innovative technology, optimal execution of works and exemplary projects"*

Available for download from: http://www.one-stop-shop.org/sites/default/files/State-of-the-art-report.pdf

In order to support the general objectives of the One Stop Shop project, in the first phase of the project, a "stateof-the-art" was drawn up on several relevant topics considering low energy renovation, as explained below. The information gathered was used within the project itself, but also serves as output to the 'One Stop Shop' Platform (concept) and stand on its own as interesting information for actors involved in deep renovation.

The report provides the summary of the results and a critical review on four specific topics described below. The information on each of the four specific topics described below is also available as self-standing results of the One Stop Shop project website. In this way, the individual topics are made more visible and possible for direct dissemination to target SMEs.

1) The market potential of housing renovation

For each of the participating countries (Belgium, Denmark, Finland and Norway), the most important and interesting typologies of the residential building stock are identified based on statistics. This allows for identification of certain market segments (in terms

of building types to address or types of clients to address) that have high potential for companies to offer integral renovation services to their owners. The main conclusions are that:

- Based on the high number of houses built from the 60'ies and through the 80's, houses built in this period represent the highest potential for deep renovation, also since a high amount of these dwellings still have not been through a major renovation.
- Differences in typologies between the countries exist. Most residential buildings suitable for retrofit are owner-occupied, but they differ in terms of:
  - » General characteristics of the housing stock. For example, regarding the age of the building stock, Finland has a relatively younger building park (only 8% of the houses is constructed before 1945), Denmark has had a couple of 'construction peaks', whereas the age of buildings in Norway is more spread and the stock in Flanders is relatively young. Also, architectural styles, insulation levels, and the evolution of construction solutions differ.
  - » Energy use, in particular supply for heating and warm water. For example, Finland has a lot of electricity heated buildings, whereas this share is very limited in Flanders, where oil and gas are predominant. District heating is also more popular in the Nordic countries as compared to Flanders.
  - » Ownership: In most countries large opportunities are detected in dealing with owneroccupied houses, but the support and legal structures for owners/ occupants can differ in different countries.

Based on building classification according to size and age, showcase examples were used to demonstrate energy savings achieved by retrofit measures. These cases serve also in WP2 and WP3.

Individual Report: *"Residential Building Typologies in Project Partners' Countries "*

Available for download from http://www.one-stop-shop.org/buildingtypo

2) Innovative products and techniques for low energy renovation

The market for very low energy housing renovation is emerging and developing. Therefore, a state-of-the-art inventory (Catalogue) of innovative products and techniques was made to determine the newest possibilities available or emerging on the market, and to 'trigger' thoughts and interest of contractors and designer, and as such to stimulate innovation in the practice of design and execution.

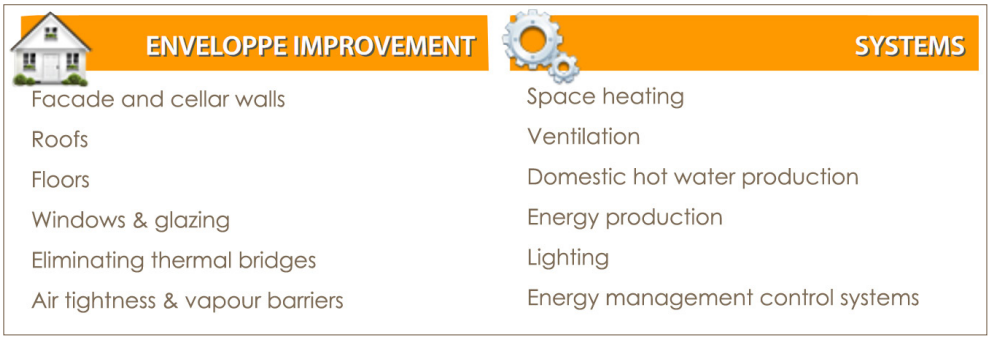
All products and techniques are available for download from: http://www.one-stop-shop.org/catalogue Besides stimulating innovation in practice, this inventory also allowed to exchange knowledge and innovation between different regions/countries, and to identify certain trends and options for further development. The identified 'innovations', gathered by the different project partners in each country, are structured as a 'product catalogue', with a one-page-per-product or -technology lay-out.

Some challenges in compiling, communicating and continuing such a catalogue system were identified during the process:

- The forms made by the project consortium are based on the available information, usually coming from the producer, with a critical review on pros and contras. It was not always possible to verify all statements and to give enough relevant technical data on some of the products.
- The forms are meant to provoke thoughts and interest to further investigate certain technologies, and to 'open the mind and view on current practice'. Careful attention should be paid to local circumstances and additional considerations (such as long term performance, state of validation, ...) when wanting to apply a certain technology.
- The catalogue can also be expanded to a broader scope. Not only 'innovative' products could be added, but also existing, 'best practice' technologies could form a part of the catalogue, or 'innovative services' could be included.
- Other actors can deliver input for the innovation catalogue. In first instance, companies can upload their own product forms in the available template, as a sort of 'proof' or demonstration of their commitment and capacity to act in low energy renovations. A generic innovation form for uploading is created for companies, and is available on: http://www.one-stop-shop.org/sites/default/files/OneStopShop_Innovation_Template_0.dotx
- When third parties can deliver input, it should be clear that the source is 'different' from the One Stop Shop research partners. It is difficult to control the content of the forms, or to play the role of 'gatekeeper', when input from third (commercial) parties is welcomed. It could be a possibility to establish a 'review committee of experts' that approves new forms.
- Someone will have to maintain the database beyond the scope of the project. Therefore, it would be interesting if the system of uploading product forms is integrated in a broader 'one stop shop' platform. It might also be worth investigating if new forms could be uploaded at a certain cost or fee, in order to cover the server and operational costs.
- Establishing a catalogue with 'best practice products' does not mean that a building professional needs to assess the actual situation on site in order to select the best way of doing things or the products the most suitable for use. General guidance

on technology to use and best practice can be provided, but in each case, a project specific approach is needed.

The general structure of the 'catalogue' is divided into 2 parts: Envelope improvement & Systems, structured as shown below. In total: 42 individually described innovative products and techniques, out of which 27 for envelope improvement and 15 for systems.



Source: http://www.one-stop-shop.org/catalogue

The identified products can broadly be categorized according to their basic 'innovative' characteristics:

A. Improved performance / new concepts

Several of the forms describe 'new' (construction) products or materials that allow fulfilling a certain function in a more performing or alternative way. A new concept can also be understood as tackling problems that exist when using more traditional products.

B. Improved execution

Another way of getting a better performance can sometimes be achieved through a better execution. Some 'assisting' or 'smarter' products are available on the market, or alternative solutions for execution are being developed, in order to improve the situation 'on site' and the final performance.

C. Integration of functions

Instead of combining elements on the site, the different renovation aspects and functions are integrated in prefabricated modules or into one product. This can save time and may allow instalment with less 'disturbing' actions on the other products.

3) Interactions in the renovation process

Besides the 'business aspect' on cooperation and clustering in the renovation process (in order to tackle the fragmented approach that is usually observed), it is important that the integral approach is also translated to the practice, and thus towards the good execution and coordination of the works on the construction site. This attention point of 'interaction on the construction site' can be solved by technical solutions, organizational improvements and innovative applications.

From previous research (www.lehr.be) it became clear that 'in the field' or on the renovation site better communication and cooperation is needed. Especially in striving for nearly zero energy buildings, aspects such as: air tightness, thermal bridges, correct dimensioning of ventilation and heating are very important. When executing a certain task, it is possible that it disturbs work already done; for example destroying the air tightness layer. On the other hand, certain tasks may lead to problems further on (not foreseeing future connections) or can already during their execution facilitate future renovation tasks. This means that every activity executed during the renovation process should take into account the work already executed and the current situation on the one hand, and also keep in mind tasks that will be executed later on in the process. All tasks should fit into an integrated, global concept.

In order to deal with these challenges, the different points of attention and interactions between the different professionals in the renovation project were mapped. In first instance a methodology to create this list of 'potential problems' or rather 'interactions' was established. The elaborated list of points of interest then served as a basis for solution development. The document explaining the methodology can be downloaded from: http://www.one-stop-shop.org/interaction

An accessible, easy to use interface was conceived, in order to facilitate communication towards the target audience. A visual house model is used in which all the relevant renovation activities can be selected. When clicking on a task, the model shows the related interactions and potential problems. This way of presenting information allows for a direct approach towards the different contractors with their own expertise, and can form the basis for better communication and better understanding between the actors.

Graphical interface of the interactions model (source BBRI, leader WP1)

The listed interactions can be solved by 3 types of solutions, also included in the model:

- Technical solutions: reference to a technical drawing of a detail
- Organizational solutions: adapting the order of the works, or making clear arrangements about responsibilities of the different actors
- Innovative solutions: for some difficult to tackle problems, there can be new solutions, that solve the issue. Reference was also made to the catalogue of innovative products.

For each of the 'typical renovation activities' or rather professions, an individual list of attention points (on beforehand & afterwards) was created, and solutions for the attention points are listed. For the implementation of the solutions, reference was made to:

- Existing information on good and best practice solutions, such as:
  - BBRI's Technical Notes and Technical Fiches
  - Catalogue of thermal bridge solutions
  - Guidelines for better ventilation
- Best practice examples from the case studies
- Exemplary projects
- Innovative product catalogue and forms.

This ***list of attention points*** was created for: Roofs, Floors, Windows & doors, External Walls, Finishings and Installations. The complete lists and model will be available on the BBRI website (www.bbri.be) in Dutch and French. The actual publishing was not feasible within the timeframe of the One Stop Shop project, and is foreseen by the end of 2012.

Workshops

Two workshops were organized in Belgium. One workshop focused on interactions in the renovation process, another was more specific on ensuring the air tightness when installing new joinery in a renovation.

Workshop 1: Interactions in the renovation process:
Workshop 2: Air tightness when renovating joinery:

Reports of these workshops can be downloaded from: http://www.one-stop-shop.org/interaction

4) Exemplary cases

Demonstration projects are a source of information on technical possibilities, approaches, innovative applications (technology & organization, business etc) and show the feasibility of certain ambition levels, eg. in achieving very low energy

consumption in renovation. Therefore, within the One Stop Shop project, several cases were documented in order to further disseminate the lessons learned in the projects. By documenting real case studies, an interested client can see what the possibilities are for their type of house.

Frontrunner projects can also be a 'tool' for professionals to show and communicate their skills in the field of deep renovation. The documented case studies were used also in the work on clustering: the "front runner" actors involved, were identified and compiled into a list of 'actors to go to' when one wants a low energy renovation. This is further elaborated other One Stop Shop WPs.

The following documented exemplary cases of 'deep renovation' are available from: http://www.one-stop-shop.org/projects

- Row house in Torhout, Belgium
- 5 social row houses in Wachtebeke, Belgium
- Row house in Antwerp, Belgium
- Large row house in Eupen, Belgium
- Sub-urban detached house in Lo, Belgium
- High rise apartment in Antwerp, Belgium.
- Semi-detached house in Ulvøya, Oslo, Norway

WP2 Optimal renovation strategies from environmental and economical viewpoint

WP Leader: BBRI, Belgium

Objectives

The general objective of this work package was analyzing and documenting cost and benefits of deep retrofit from economic and environmental viewpoint and investigate the feasibility and environmental/cost profile reflected of striving for/reaching of a nearly Zero Energy level in renovation, complimented by a robustness analysis of the results and conclusions.

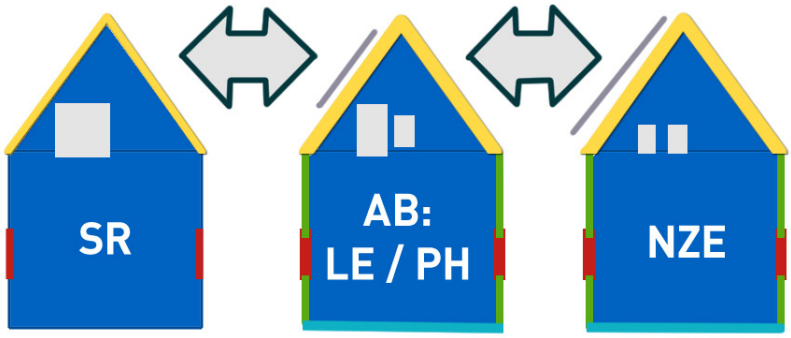
The output of this work was used further in the OSS work program: demonstrated costs/benefits for communication to and by SMEs; cost aspects and validity of results in relation to business concepts; information and dissemination to technical and general audience.

Report: *"Case studies: Cost efficiency and environmental impact of renovation strategies"*

Available from: http://www.one-stop-shop.org/optireno

Approach

The work consists of executing life cycle costing (LCC) and life cycle analysis (LCA) on selected case studies, to gain insight into the cost efficiency and the environmental aspects of different applied techniques and scenarios in real house retrofit demonstration projects.



Comparison of the As Built renovation (whether this is Low Energy (LE) or Passive House (PH) level) to a Standard Renovation (SR) and a Nearly Zero Energy (NZE) renovation in terms of life cycle costs and environmental impacts

The two cases analysed in detail are Flemish row house configurations. These were selected because of data availability and ambition level.

Case 1 – Wachtebeke – Renovation of 5 social row houses to Passive House Standard

In a social housing neighbourhood in Wachtebeke, Flanders, about 300 houses of the same age and typology were constructed in the early 1970s. One block with five row houses was selected by the VMSW (Flemish Agency for Social Housing) for a pilot project on renovation towards passive house standard. The houses are oriented North-South, and were unoccupied at the time of project selection.

A more detailed description of the context and the project can be found in the separate project leaflet which has been created in the One Stop Shop project. In short, the following renovation measures were taken:

- Renewal of the roof with reuse of the existing roof structure;
- Insulating the attic floor with 36 cm mineral wool;
- Demolition of the outer leaf of the external façade (cavity wall construction) and installation of 32 cm EPS insulation with putty finishing;

- Excavation of the foundations and placement of cellular glass and XPS insulation in order to prevent/solve thermal bridges at the floor and foundation;
- Adaptation of the window openings according to orientation an installation of triple glazed windows in adapted frames;
- Filling of the crawl space underneath the ground level floor with 40 cm of EPS pearls;
- Renovation of the floor finishing while adding 4 cm of sprayed PU-foam;
- Improving the airtightness of the building (by repairing the existing internal plaster finishing);
- Installation of a new system for heating, ventilation (mechanical with heat recovery) and production of hot water in 1 combined installation ("compact unit") that heats the exterior inlet air through heat recovery. The outlet air is fed to the air-water-heat pump for heating the ventilation air for the house and the integrated hot water boiler. The compact aggregate is combined with a thermal solar boiler, with panels on the roof facing the South.

CASE 2 - Torhout - Deep "architectural" retrofit of two row houses

Retrofit of 2 row houses from the 1970s. Before (left) and after (right) © Benergie.be - Architect L. Dedeyne

Architect Luc Dedeyne renovated and transformed two neighbouring houses, dating from the early 1970s, into a single family house with private practice (architecture office). The pictures show that one of the goals of the architect, also being the home owner, was to achieve an 'architectural' façade with all elements (doors, windows, façade finishing) being placed within the same vertical plane (**Fout! Verwijzingsbron niet gevonden.**). The most important measures taken are:

- Replacement of the floor slab on the ground floor and installation 15 cm EPS insulation;
- Replacement of the roof and installation of 32 cm additional mineral wool;
- Renovation of the street façade by demolishing the outer leaf of the cavity wall and installing 24cm of cellular glass with a ceramic materials as finishing layer;

- Replacement of old windows by triple glazed aluminium windows;
- Addition of Vacuum Insulation Panels (VIP) to the aluminium doors and garage door.
- Installation of a large (25m²) solar boiler, floor heating, heat pump and PV-installation (3.4 kWp).

Results & conclusions

The report on the One Stop Shop-website describes both cases, the applied renovation scenarios and the methodology for LCC and LCA used in detail.

The conclusions are based on a limited set of case studies: Both cases were constructed in the early 1970s, the cavity wall construction was in a bad condition (so demolition of the external façade wall was an option) and both projects are row houses, with an ideal north-south orientation Therefore, the conclusions are valid for the presented cases, but should not be considered as a general truth for other case studies with different boundary conditions.

It should also be stated that a discrete number of alternative scenarios was analysed. This means that the optimum solution might not be considered.

A) Cost efficiency (in a 30 year timeframe):

Depending on the circumstances and the costs considered, different renovation scenarios and ambition levels (Standard Renovation - SR, Low Energy Renovation - LE, PassiveHouse renovation – PH, NearlyZeroEnergy renovation - NZE) are **the most cost efficient:**

- In the Wachtebeke-case, when only electricity is available as energy source, it is cost efficient to invest in energy saving & producing measures, to avoid the electricity consumption costs. All energy saving renovation scenarios show a similar Net Present Value over 30 years. This trend is even reinforced when taking into account subsidies and financial grants: the large PVinstallation in the NZE-renovation becomes even more interesting due to green power certificates.
- When natural gas for heating would be available on the site, the K40-alternative, where the case is insulated up to "current newly built houses' insulation level", would prove to be the most cost efficient. This does not change when subsidies are included in the calculation.
- The Torhout case shows that without subsidies, the Standard Renovation (similar to the K40-alternative in Wachtebeke) would be the most interesting alternative, due to the limited investment cost. Subsidies place the LE-PH and NZE renovation on the same level, but the SR remains the most cost efficient.
- The largest gaps in the investment cost between the different renovation scenarios of both cases are the demolition of the outer façade wall for the placement of an

ETICS, and the investment in more and better installations (ventilation & PV). Also the maintenance & replacement cost of the alternatives with more sophisticated installations play an important role in the lower cost efficiency.

It should be remarked that in the 'OLD'/before renovation situation, both cases already are insulated in roof & walls. This causes a large additional cost to do a renovation. However, given the bad state of the cavity walls (on the interior of the cavity), it is on the safe side to demolish the external façade wall and repair the inner wall before insulating it.

The results show that to obtain "NZE-level" from the As Built level, already a very low energy demand for heating & cooling is required. For the Wachtebeke project, this is the case (Average U-value= 0.18W/m²K , Kvalue = K14). For the Torhout project, however, the average U-value of the 'As Built' case is 0.3 W/m²J (& Kvalue = K21), due to the large glazed surfaces and large surface of garage gates. For the Torhout-project, it is not feasible to go to NZE (still over 23 kWh/m²a required for heating & cooling) using a large PV- and solar boiler installation.

The additional costs compared to the As Built situation to obtain the NZE-level are 6.5% (Torhout – already expensive envelope renovation due to special materials used) & 15.6% (Wachtebeke). This is efficient in the Wachtebeke, when the electricity consumption for heating has to be compensated as much as possible. When taking into account value or costs at the end of the analysis period (after 30 years) the advantage goes to the better insulated alternatives: they have a higher 'residual value' or require lower investment costs at that point in time to 'upgrade' to NZE-level (which will be common at that time).

The first experiment in comparing a 'phased renovation approach' to a 'integral all-in-once'-approach showed that the investment costs are dominant compared to the energy savings. Phasing the renovation is more interesting for the investor, but is not more or less cost efficient in the long run than an 'all-in-one'-renovation.

B) Environmental impact (on a 60 year basis)

The conclusions for the environmental analysis are much more straightforward. Adding materials and installations to save more energy is beneficial for the environment. The additional impact of insulation or PVpanels is limited compared to the avoided impact due to energy savings. Starting from the PH-alternative, the impact of the materials used becomes dominant to the energy consumption impact, and thus at that point, a well-considered choice for materials and installations with a low impact becomes important.

However, the environmental benefits come with a price tag: The additional cost to obtain NZE-level compared to the K40-scenario are resp. 60,000 € (from 55,000€ to 115,000€) and 75,000 € (from 175,000 € to 250,000 €).

Illustrations

Life cycle costs (30y NPV) of different renovation scenarios in Wachtebeke, using electricity only

The investment costs (blue-red-green-purple-cyan) augment from a basic SR-Standard Renovation scenario (32 000€) up to an investment cost of 117 000€ in the NZE-scenario. The investment costs include costs for the envelope, the installations and some secondary costs.

Energy costs over 30 year (orange) and maintenance & replacement costs (black) are added to the investment costs in order to show the total NPV of the different scenarios. It is clear that most scenarios, from K40 to NZE have a similar cost effectiveness, despite the large differences in investment costs. The higher investment costs and the higher maintenance costs in the more ambitious scenarios level up to the costs saved through energy savings & production.

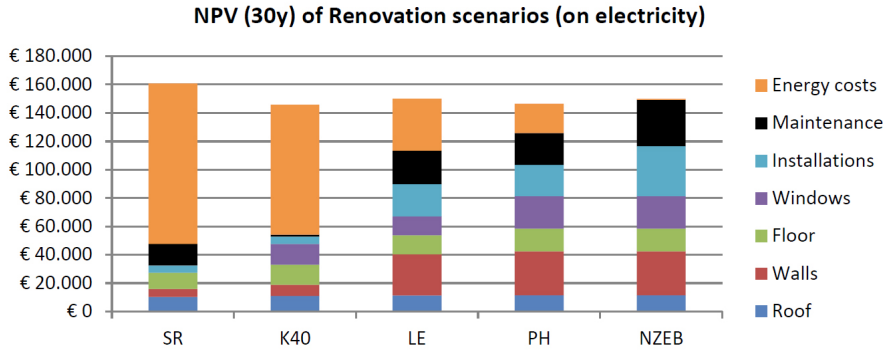
Standard renovation (SR): applying typical, minimal renovation measures as applied in similar social houses in the neighbourhood;

K40-renovation (K40): considering the same minimal renovation measures as for SR, but adding sufficient insulation to arrive at a general insulation level of K40 (as required for Flemish new buildings anno 2012);

Low Energy renovation (LE): taking the renovation measures of the 'As Built' scenario (PH) as a reference, but with limited thicknesses of insulation and less attention for air tightness;

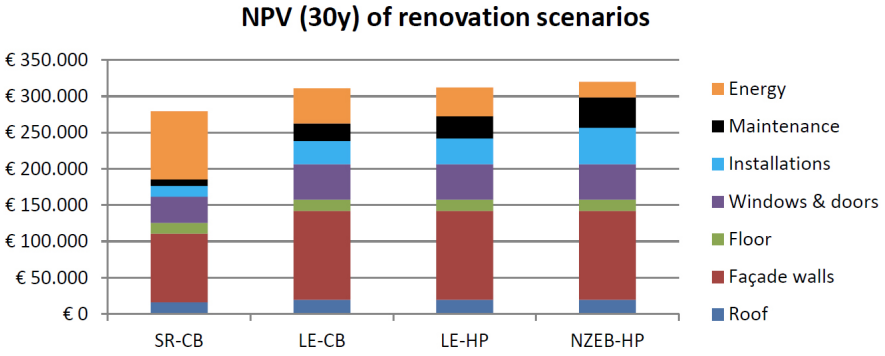
As built (PH); Nearly Zero Energy renovation (NZEB): taking the renovation measures of the 'As Built' scenario (PH) as a reference, and adding renewable energy production to obtain a nearly zero energy building.

When financial aids are included, the NZE is the most cost efficient. When only electricity is available, it is cost efficient to go 'all the way.

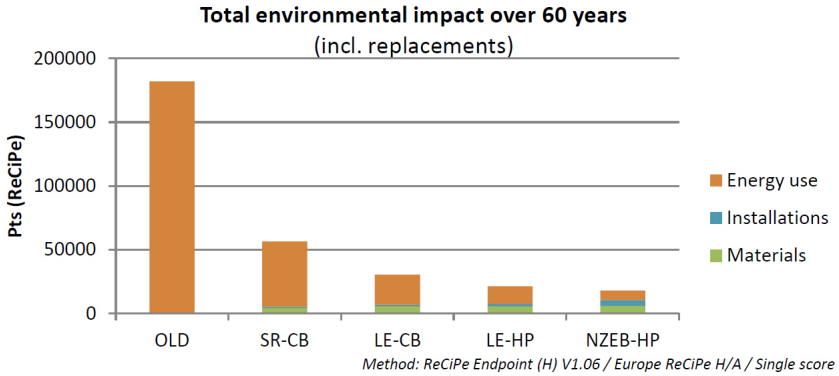


Life cycle costs of the Torhout case

The 'as built' situation is a 'low energy' configuration. Two installations are considered: a condensing boiler on gas (LE-CB) and a heat pump (LE-HP). Based on this scenario, a less ambitious Standard Renovation scenario (SR-CB) and a step towards NZE via installing PV and solar boiler (NZEB-HP) were analyzed as well.



Environmental impact of different renovation scenarios in the Torhout case



The figure shows the impact of: the materials used in the renovation (green), the installations & their replacement (in blue) and the impact of energy consumption (gas & electricity) during 60 years.

The figure clearly illustrates that the impact of energy consumption is dominant, up till the point where the energy consumption is limited to 'nearly zero'. On that moment, the impact of materials & installations becomes more dominant.

WP3 Innovations in Supply Side for Sustainable Renovation

WP Leader: PHP, Belgium

Objective

The objective of this work package was to develop a working methodology focusing on innovations in sustainable renovation for SMEs, resulting in stimulating 'Clustering Innovation Technologies in Sustainable Renovation'.

This was done by identifying and stimulating pathways to:

- overcome the fragmentation in offering a 'cluster' of renovation measures by a SME
- stimulate combinations of renovation measures towards SMEs offering whole renovation solutions, e.g. turnkey supply
- increase knowledge, skills, capacity and competitiveness of SMEs, particularly regarding collaborative approaches

A methodology was developed and evaluated with the Flemish market as a case study, and made available to partners for replication in their country/region. The methodology comprised the following key elements:

- Identification of SMEs with renovation skills across participating countries / regions.
- Categorization of SMEs according renovation experience and activities.
- Identification of needs and potential in technology innovations, resulting in Working Groups for stimulating 'Clustering Innovation Technologies'

Work package 3 resulted in two main deliverables:

Report 1 *"Methodology for innovations in supply side for sustainable renovation".*

Report 2 *"Implementation phase – Innovation in Supply Side Collaboration".*

The Flemish market study was followed closely by a Study Advisory Group with representatives of important groups of actors involved in building renovation in Flanders. A key organization of the Advisory Group was the VCB, the Flemish Building Confederation as most representative organization for the building industry in Flanders with around 10.000 members. Two persons of VCB were delegated to represent VCB in the Advisory Group. VCB identified SMEs in Flanders, using questionnaires and their own network. VCB, PHP and BBRI jointly engaged the Advisory Group in Working Groups. Two thematic workshops were organized to facilitate working groups (organized by BBRI and PHP). Workshop contributions in Stimulating Innovation Clustering were jointly organized and structured for all VCB members in the framework of a final workshop during the Passive House building fair in Brussels. The results of these contributions are presented in the reports and in various research papers.

Key findings

WP3 identified as a key opportunity for overcoming fragmentation, the identification of strategies for supply chain collaboration, while at the same time customer demand for integrated renovations has to be stimulated. The current fragmentation – separate SMEs each doing a fraction of a supposedly integrated renovation – cost escalation, lack of knowledge and lack of project management are very important barriers to the advanced energy renovation of single-family housing. Renovation processes need to be reformulated and better collaboration structures need to be developed to unburden the client. In order to respond better to the supplyside concerns identified, both supply- and demand-side actors need to be informed in a more targeted way.

Theory on innovation-decision processes provided an interesting basis for the development of various elements in the methodology. We related different 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, as well as a need for support schemes for integrated renovation.

The methodology particularly identified the need to develop web platforms and specialised courses to increase the flow of technical information on integrated renovation and project management knowledge. Demonstration projects were found to be crucial for the development of tacit knowledge about integrating technological innovation. Such demonstration projects can be used to define 'experienced' actors. 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.

Next to technological innovation, a large potential for systemic and process innovation was identified, particularly for project coordinators who can support the homeowner throughout the decision-making process. These actors could serve 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.

" Methodology for innovations in supply side for sustainable renovation"

Executive Summary report available to download from: http://www.one-stop-shop.org/collaboration

The development of this methodology was supported by two practice-oriented studies: 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. 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.

The results were used as input for a second study on existing communication channels, e.g. 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 analyzing 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[1]. These 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

1 See Work Package 5 report

defining a new networking methodology for stimulating business collaboration (the Implementation phase described below). Furthermore, the methodology was used for the development of a One Stop Shop web portal flow chart that reflects homeowners' decision processes (WP5). Also, the methodology provided inspiration for developing the Guidelines "How to develop a business model for One Stop Shop house renovation" (WP4).

1. Key concerns from the supply side

The first study examined the key concerns and existing opportunities from the supply side. This was done using two parallel approaches.

1. The experiences from exemplary projects[2] – specifically in the field of highly energy-efficient singlefamily home renovations - were used to find difficulties and bottlenecks in real examples.
2. A web questionnaire was developed to register the ideas of key market players, such as contractors, even those without actual experience on very ambitious projects. 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.

Experiences from demonstration projects

The research helped in defining the innovations related to highly energy-efficient integrated housing renovation[3]. 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. Many traditional craftsmen were found to be unfamiliar with the innovations or not used to work together on whole building solutions. Also, problematic coordination can result in lower quality and substantial disturbance of the occupants.

To overcome these socio-technical barriers, an option is to lift up the level of knowledge and collaboration of the craftsmen or to increase construction speed and minimize hindrance. A detected key opportunity concerns providing one key responsible for the whole renovation: an 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[4].

2 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).

3 See also Work Package 1 report: catalogue of innovative products and systems

4 This proposition was reflected on practice in Work Package 3 part 2: "Implementation Phase"

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/sites/default/files/additional-case-descriptions.pdf

Questionnaire results

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

The results[5] reflected that the (Belgian) renovation sector is dominated by micro-enterprises. Many companies were active in the finishing and/or technical issues within the housing market[6]. About one third of the respondents 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[7]. Companies already renovating full buildings were found to have least interest in collaboration[8].

The results showed that in the first place the client (the demand side) has to be reached with information (see Figure 1: questionnaire results). The research results further showed strong preference of enterprises for awareness rising. They also highly valued more grants for highly energy-efficient renovation, courses and better technical information on innovation and making a list of experienced companies[9].

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

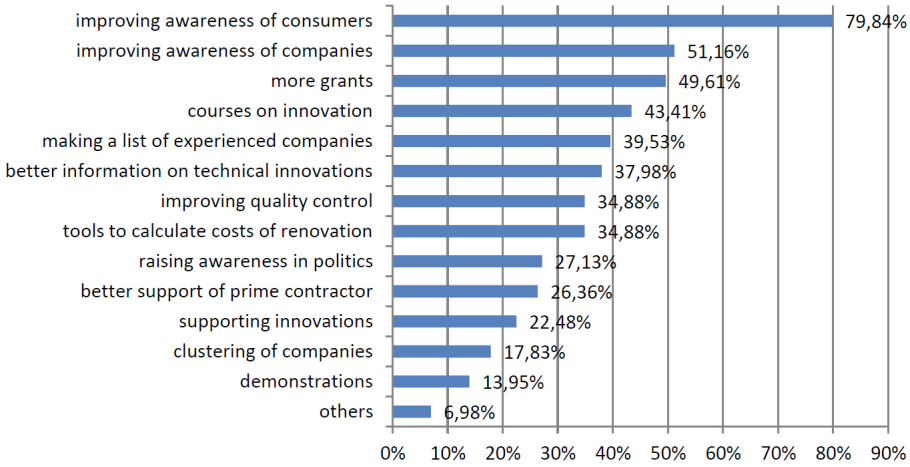
6 When asking what their main area of activity is, 29% stated to be active in "finishing" works (painting, flooring ...) and 29% to be active in "installations" (heating, plumbing). When going more in detail, within "finishing" the respondents mainly chose for insulation, ceilings and internal walls. Within "installations" heating, ventilation and plumbing were picked as the main activities. On average, a company denoted five choices.

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

8 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.

9 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.

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/sites/default/files/questionnaire.pdf

2. 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. The theory of innovation-decision models was used to contribute to a better understanding of what drives decision processes in both customers and SMEs to adopt

innovation. From theory, it defined needed knowledge levels for communication channels - such as webbased portals - so that the potential adopter is guided through the whole decision process with the right information in each step. This theory was applied for defining strengths and weaknesses of various existing web portals on housing renovation that aim to connect supply and demand.

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. Most examined web platforms showed severe weaknesses for providing information on integrated renovation or technological innovations. No existing web platform was found that provided an answer to all the following questions:

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

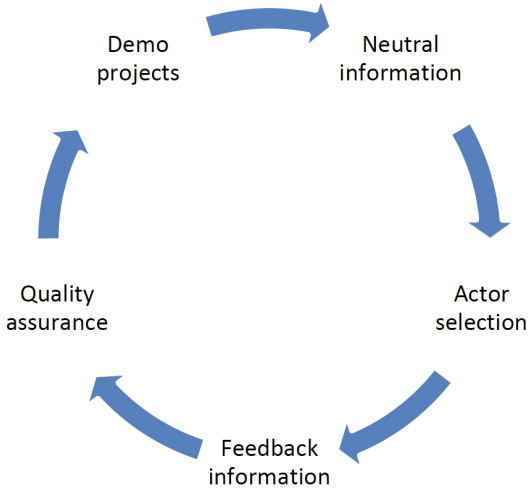
As such, the study provided direct input for the web site development in WP5.

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 webbased portals: Country Reports, Available on-line: http://www.one-stop-shop.org/sites/default/files/web-portals-country-reports.pdf

Based on the research results, the first report of WP3 concludes with presenting a coherent methodology to stimulate innovation in supply side, supply chain collaboration and end-user adoption of innovation. We suggested 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.

"Implementation phase – Innovation in Supply Side Collaboration"

Executive Summary available to download from: http://www.one-stop-shop.org/collaboration

As part of implementation research, we identified important actors regarding supply chain collaboration in four different countries (Belgium, Denmark, Finland and Norway). As such we identified which actors need to cooperate and who plays what role in the innovation adoption process. We proposed that actors involved in an integrated communication channel - like a One Stop Shop - need to guide the homeowner through each step with information specific for that decision phase. For this reason, we continued the logic of the five steps in the innovation adoption process when categorising actors and defined actors for each country in actor categories as: informing, convincing, deciding, implementing, and/or confirming. Table 1 provides an overview of the detected actors and possible actors in various countries.

Table 1: Detected (possible) actors in various countries for the development of supply chain collaboration in One Stop Shop initiatives.

	Belgium	Denmark	Finland	Norway
Informing actors	Various; label providers	Various; independent public organization, label providers	Various; House-owner association	Various; ENOVA
Persuading actors	Energy performance advisers, financial advisers, Flemish Energy Agency, municipalities, provincial network sustainable building, Passiefhuis-Platform, energy distribution managers, 'energy cutters', reference centres	Government, municipalities (Tupperware-model)	R&D actor, government, Regional Environment Centres	ENOVA, Norwegian State Housing Bank, municipality, savings bank, utility network supplier
Responsible actors	Homeowner, contractor, architect, project manager, consortium, renovation shop, turnkey supplier	Homeowner, educated craftsmen (energy adviser), energy consultants, architect	Traditional	House-owner, architect, building engineer, carpenter, small entrepreneur, house-owner association, Bolig Enøk, Enøksenteret
Imple-mentng actors	Craftsmen; acknowledged craftsmen (public list), ecocluster	Craftsmen (energy adviseror 'Green craftsman')	Complete service package providers, traditional first line services, industry	Trained craftsmen
Quality assuring actors	Cost managers, energy performance verifiers, project certifiers	ESCO light	Energy consultants, service providers, Inspecta	(warranty)

More information:
Mlecnik E., et al. (2012) Project Report WP 3 - Implementation Phase Innovation in Supply Side Collaboration: Renovation Actor Categories in Partner Countries, Available on-line: http://www.one-stop-shop.org/sites/default/files/actor-categories-in-partner-countries.pdf

Workshops

One workshop focused on interactions in the renovation process (led by BBRI, see WP1). Specific to this work package were two other workshops on supply chain collaboration for housing renovation.

Collaboration workshop 1: "Business Zoo", Antwerp, Belgium, on 18 April 2012 (in collaboration with Enterprise Europe Network: see http://www.b2match.eu/businesszoo)

Collaboration workshop 2 (jointly with WP4): Nordfjordeid, Norway, on 19 June 2012.
In the two collaboration workshops we focused on exploring opportunities for collaboration between actors from different categories as explained above.

A specific networking methodology was developed which involved clustering innovative players to detect novel business models (as output from and input for WP4). These events aimed to inspire actors regarding novel forms of collaboration in the renovation chain in order to realise integrated sustainable housing renovation and reduce the fragmentation of the renovation process for singlefamily houses.

After allowing key stakeholders to present key problems by market stakeholders and facilitating group discussions on these problems, the participants were grouped into the actor categories mentioned above using animal pictograms, and were asked to brainstorm on renovating a particular house. In this exercise, the homeowner was given a central role in enforcing demands, so that the supply side actors were forced to think from the client's perspective.

We used a predefined 'animal gathering' canvas (see Figure 1) to facilitate this process.
At the end of the day, the participants were urged to take up the challenge of developing new business models, expanding the previous case development to the volume market. Different groups developed specific integrated business models for deep and sustainable renovation, using a business model generation canvas (see Figure 2).

Fig. 1. Impression from the Business Zoo workshop (animal gathering canvas development).

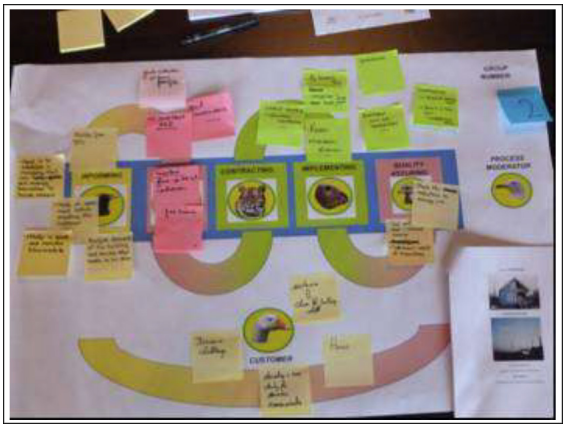
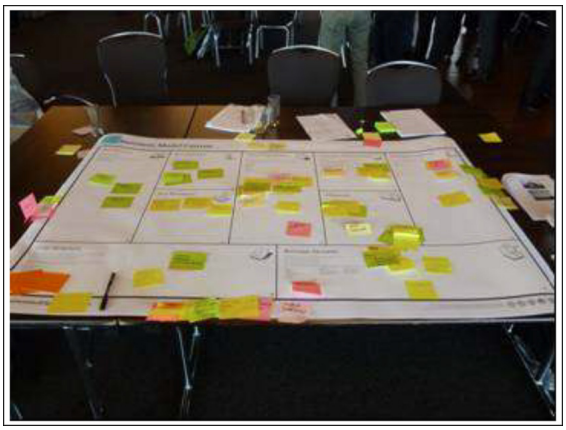


Fig. 2. Impression from the Business Zoo workshop (business model canvas[10] development).



During the workshops, we detected that substantial innovation was still needed on the supply side, especially regarding collaboration between different craftsmen and experts. Process and service innovations are needed to coordinate the whole renovation process and a range of craftsmen, to allow homeowners to find all the information concerning deep renovation solutions and examples, to ensure quality while keeping costs and energy performance under control, and to manage the homeowner's administrative burden and financing. In order to prepare for a growing market, companies must be prepared that the homeowners expect one single point of contact to take responsibility, act as project manager, and ensure quality and efficient, rapid execution.

More information:

Mlecnik E., et al. (2012) Project Report WP 3 - Implementation Phase Innovation in Supply Side Collaboration: Business Zoo - Innovative business models for integrated housing renovation, Available on-line: http://www.one-stop-shop.org/sites/default/files/Business-Zoo.pdf

10 Based on A. Osterwalder & Y. Pigneur, Business Model Generation, http://www.businessmodelgeneration.com

Mlecnik E., et al. (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.

Business Zoo - Innovative Business Models for Integrated Housing Renovation, Event information available on-line: http://www.b2match.eu/businesszoo

Mlecnik E., et al. (2012) Opportunities and barriers for business modelling of integrated energy renovation services, paper presented and published at the Nordic Passive House Conference 2012, Trondheim, Norway, 21-23 October 2012

Flemish case study resulted in public actor list for promoting sustainable housing renovation

To shape regional supply chain collaboration to effectively increase the number of such renovations taking place, innovator activities were used as input for a strategic reflection by actors which consider taking an active part in developing the market for advanced housing renovation. As such, the Flemish market study and Advisory Groups found that contractors currently rarely offer integrated and/or sustainable renovation as a service or product.

For realizing integrated renovation, usually collaboration occurs with some architect, consultant, contractor and/or installer who have previously shown experience with demonstration projects or in previous reference projects. A key opportunity was therefore detected in making these innovators visible on the market.

Various interviews with clients and public actors confirmed that there is a specific need for clients and procurers to easily find experienced actors, particularly architects, contractors, consultants and installers.

The report, available from: http://www.one-stop-shop.org/sites/default/files/public-actor-list.pdf, describes in detail how such a public actor list was organized for marketing and selection of innovators in renovation services, using the situation in Flanders, northern Belgium, as an example.

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.

More information:

Mlecnik E., et al. (2012) Project Report WP 3 - Implementation Phase Innovation in Supply Side Collaboration: Development of a public actor list for promoting sustainable housing renovation in Flanders and Brussels, Available at: http://www.one-stop-shop.org/sites/default/files/Actors-list_2012_08_30_Vlaanderen+Brussel.pdf

WP4 Development of "White Book" for establishment of one stop shop and testing of different concepts through pilots

WP Leader: Segel, Norway

The Guideline *"How to develop a business model for one stop shop house renovation"*

Available to download from: http://www.one-stop-shop.org/collaboration

In line with the project's overall objectives, a guideline was made to facilitate the process for companies intending to establish a One Stop Shop business for holistic renovation of single family homes. The guideline was based on experiences of the authors from pilot models in both the One Stop Shop project and the Success Families projects.

The authors studied different business models that have been launched in the participating countries. Based on the lessons learned from these cases and combined with the authors' substantial experience in business development, this guideline are helpful for companies planning to develop the market for energy-efficient renovation of single family homes. The guideline is meant to be practical throughout the process, starting with analyses and preparations and ending with implementation and how to follow up.

Research approach

Several business models for single-family house renovation were studied and guidelines were developed around the examples of new business models detected. These examples include descriptions of stakeholders and the company in charge, cooperation, product and services offered, marketing and educational programs, as well as responsibility and quality assurance.

The information was gathered in one-on-one meetings and in workshops and a seminar (held in Norway), which were attended also by representatives from state agencies, national homeowner association and supply side organization. The seminar in Norway was very fruitful in providing an overview of the market situation for holistic renovation of single family housing. Particular attention was given to the introduction of governmental measures in the market in order to push holistic thinking rather than sub-optimal solutions.

Cooperation was established with pilot projects developing different types of business models. These different models involved different stakeholders from various levels in the value chain, and their product range mirrors the companies involved as well as the company in charge of the business. One such model was Bolig Enøk AS, the Norwegian pilot project (company established in 2010 and developing a One Stop Shop service, defined as a "project manager" approach).

In addition to the Norwegian case, national cases of One Stop Shop business development were defined in Belgium (a "consultant" approach), Denmark (an "energy service" approach) and Finland (a "retail" approach).

These cases were used to understand whether the guidelines developed by this project would be applicable to other countries and other initial situations of business development.

The report on Belgian case study is available from: http://www.one-stop-shop.org/businessmodels

A set of different methods was used in this process of information gathering, analysis, documentation and development of the guidelines:

1. Theoretical studies:
    - Several pilot models were described and studied through [2]:
        - PEST analysis
        - Six Forces model
        - SWOT analysis

2. Osterwalder and Pigneur's "The business canvas model". [3] Workshops and one-to-one meetings with representatives from the pilot models in the participating countries
   - Discussions regarding development of the business model
3. Workshops involving the researchers and representatives from the different pilot models and governmental bodies (Norway) in order to identify barriers and drivers in a successful market introduction of new business models, through discussion of:
   - Building stock analysis
   - Different stakeholders' interests in the market
   - Educational challenges regarding holistic thinking; both for homeowners and the supply side
   - Subsidies and other measures to stimulate holistic offers rather than sub-optimal approaches
4. Participation in a networking event held in Antwerp on 18th April 2012 [4] where means of collaboration between the actors in the value chain were discussed in the context of renovation project case studies; the actors subsequently discussed the development of a business model for collaboration
5. Energy seminar and workshop held in Nordfordeid on 19th June 2012. At this workshop, a number of craftsmen discussed the renovation of two single-family houses, for which Bolig Enøk AS had performed baseline energy audits;
6. Workshops with Bolig Enøk AS regarding evaluation of their model on an overall basis, and regarding start-up activities in general
   - Product development and innovation
     - Customer satisfaction and evaluation. Customers who bought an energy efciency status report of their house were interviewed by Segel AS
   - Market segmentation and marketing activities
   - Development of educational programs; courses and training programs for professional craftsmen, hardware store employees and homeowners
   - Implementation and up-scaling of the business model in order to go nationwide.

The work in this work package also resulted in these sub deliveries:

- Market Procedures
- Financing Models
- Evaluation of Business Models of One Stop Shop

The two first sub deliveries are included as appendix to the main report (The Guidelines) of this work package. The third sub delivery was made afterwards. An important input to this report was a final workshop with the Norwegian pilot Bolig Enøk to evaluate their business model. The main experiences show that there are different types of actors which may play the key role in a One Stop Shop concept. However, in order to

be profitable for the service as such, there have to be a commercial link between those gaining of the renovation business (mainly hardware stores and contractors) and the key player in the One Stop Shop. This also illustrate the need for some important initiatives by the national authorities:

- Public support of at least 50% of the cost of the audit must be provided
- Change the business model so that the actors gaining of renovation projects (mainly hardware stores and contractors) hire Bolig Enøk for executing the audits and be a consultant during the renovation process.

Short report on evaluation of business models can be found at: http://www.one-stop-shop.org/sites/default/files/Evaluation-Business-Models.pdf

[1] SuccessFamilies 2012.Nordic project which studies business concepts for renovation services for single-family houses http://successfamilies.vtt.f/downloads.htm, reports D2.1., D2.2., D3.1. and D3.2 are particularly relevant for this paper, retrieved 27 June, 2012

[2] OSTERWALDER & PIGNEUR 2009. Business Model Generation, Osterwalder A., Pigneur Y., 2009

[3]OSS 2012. One Stop Shop - From demonstration projects towards volume market: Innovations for sustainable renovation. http://www.one-stop-shop.org, accessed: 30 June 2012.

*[4] Aabrekk et al 2012, Guidelines for developing One-Stop-Shop business models for energy efficient renovation of single family houses, paper presented and published at the Nordic Passive H*ouse Conference 2012, Trondheim, Norway 21-23 October 2012.

WP5 Development of One Stop Shop Tool in Sustainable Renovation

WP Leader: VTT, Finland

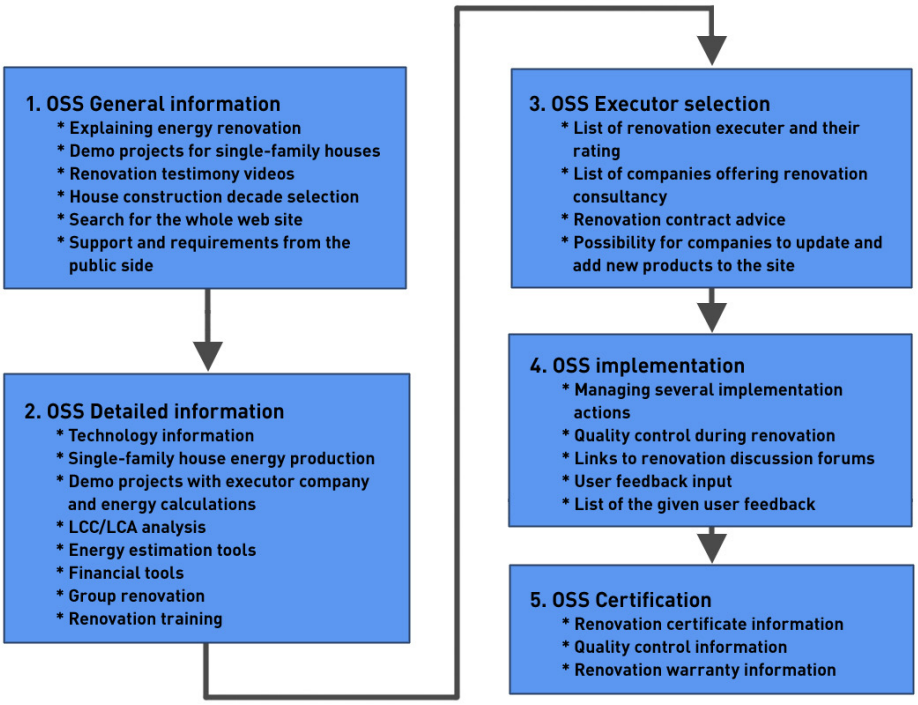
The Tool "how to create a One Stop Shop website" is available to download from:
http://www.one-stop-shop.org/collaboration

One Stop Shop Tool in Sustainable Renovation is a web site template for creating OSS Tool web sites in different locations and markets. It is only one of the possible ways, but it is an efficient way of promoting energy renovations in today's Internet based world.

The purpose of the web sites is to present energy renovations as a way to improve building energy efficiency by sharing links to information, implementation, executor companies and demonstration projects of energy renovations. Users are able to exchange their renovation experiences and rate renovation companies, which improves the whole renovation process that suppliers are offering.

The tool is based on the concepts and points of view presented in the One Stop Shop work package 3 report. Also the five-step innovation-decision learning processes are applied here. In this report in the OSS Tool they are named as 'general information', 'detailed information', 'executor selection', 'implementation' and 'certification'.

This document contains the web site questionnaire results, web site information content, a template for creating an actual OSS Tool web site and finally an example OSS Tool like web site in Finland.



One Stop Shop Tool flow chart. Source: VTT, Finland.

More information:

Mlecnik E., Kondratenko I., Hilderson W., Cré J., Vrijders J., De Graeve P., De Kimpe F., van der Have J.A., Haavik T., Aabrekk S.A., Paiho S., Stenlund O., Vanhoutteghem L., Grøn M., Hansen S., Svendsen S. (2012) OneStopShop Project Report WP 3.1, Methodology for innovations in supply side for sustainable renovation. Can be found at http://www.one-stop-shop.org.

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. http://www.rautia.fi/ideatjavinkit/energiatehokkuus/energiatesti/pages/teeenergiatesti.aspx

Following this report, the Passiefhuis Platform developed a concept for a Flemish One stop shop website on renovation.

The report (in Dutch) "Concept website rond integrale renovatie voor zowel aanbod-als vraagzijde" is available to download from: http://www.one-stop-shop.org/tool

WP6 Dissemination and Communication

WP Leader: PHP, Belgium

The target group for communication and dissemination activities are SMEs involved in housing renovation, especially those with already some experience on the high energy standard renovation market in partners countries: Belgium, Denmark, Finland, Norway.

Specific dissemination of project results

Dissemination to Passive House Symposium 2011, 7th October 2011 Brussels

Paper (WP1 related) *"Execution of very low energy renovation through an integrated approach and application of new technology"*. Authors: Jeroen Vrijders[1], Sandrine Herinckx[1], Erwin Mlecnik[2,3], Irena Kondratenko[2], Johan Cré[2], G. Matthys[4], F. De Kimpe[4]

[1]= Belgan Building Research Institute (BBRI)

[2]= Passiefhuis-Platform vzw

[3]= OTB, Delft University of Technology

[4]= Vlaamse Confederatie Bouw

Available to download from: http://www.one-stop-shop.org/sites/default/files/Execution-very-low-energy-renovation.pdf

Dissemination to Passive House Symposium 2012 (5th October 2012, Brussels)

Paper (WP3 related) *"Business model development for highly energy-efficient housing renovation"* Authors: Erwin Mlecnik[1,2,] Irena Kondratenko[1], Trond Haavik[3]

[1]= Passiefhuis-Platform vzw, Belgium

[2]= OTB Research Institute for the Built Environment, Delft University of Technology, the Netherlands

[3]= Segel AS, Norway

Presentation Erwin: *"Business Model Generation for Customer-Oriented Housing Renovation"* Authors : E. Mlecnik[1,2], I. Kondratenko1, T. Haavik[3]

[1]= Passiefhuis-Platform vzw, Belgium

[2]= TU Delft, OTB Research Institute for the Built Environment, the Netherlands

[3]= Segel A.S., Norway

Available to download from:
http://www.one-stop-shop.org/sites/default/files/Business-model-development-for-customer-oriented-housingrenovation.pdf

Paper (WP2 related) *"Costs, benefits and environmental impact of achieving NZE level in renovation: a case study"* Authors: Jeroen Vrijders, Lisa Wastiels, Sandrine Hendrickx,[1] ,

[1]= Belgian Building Research Institute (BBRI)

Available to download from: http://www.one-stop-shop.org/sites/default/files/Costs-benefits-environmental-impact-of-achieving-NZE-level-inrenovation. pdf

Dissemination to other conferences 2011 Passive and Low Energy Architecture, PLEA 2011, 11-13 July 2011 Louvain-la-Neuve, Belgium

Paper and Poster (WP1 related) *"Innovations in Very Low Energy Retrofit Projects - Experience of Belgian exemplary projects".* Authors: Erwin Mlecnik[1,2,] , Johan Cre [1], Irena Kondratenko [1], Wouter Hilderson[1]

[1]= Passiefhuis-Platform vzw

[2]= Delft University of Technology, OTB Research Institute for the Built Environment.

http://www.one-stop-shop.org/sites/default/files/Innovations-in-Very-Low-Energy-Retrofit-Projects.pdf

Nordic Passive House Conference 2011, 17-19 October 2011, Helsinki, Finland ***Paper (WP3 related)*** *"Web platforms integrating supply and demand for highly energy-efficient renovation".* Authors: Erwin Mlecnik[2,3,] Irena Kondrantenko[2], Johan Cre[2], Trond Haavik[5,] Satu Paiho[1], Jeroen Vrijders[4]

[1]= VTT

[2]= Passiefhuis-Platform vzw

[3]= OTB, Delft University of Technology

[4]= Belgan Building Research Institute (BBRI)

[5]= Segel.

Available to download from: http://www.one-stop-shop.org/sites/default/files/Web-platforms-integrating-supply-and-demand-for-highly-energyefficient-renovation.pdf

Paper (WP4 related) *"New business models for holistic renovation solutions of single family houses"* Authors: Haavik, T.H.[1]; Aabrekk, S.E.A.[1]; Tommerup, H.T.[2]; Svendsen, S.S.[2]; Mahapatra, K.M.[3]; Gustavsson, L.G.[3]; Ala-Juusela, M.A.J.[4]; Paiho, S.P.[4]; Næsje, P.N.[5]; Mlecnik, E.M.[6]; Cré, J.C.[6]; Vrijders, J.V.[7]; Van Dessel, J.v.D.[7]

[1]= Segel AS, Norway;

[2]= Technical University of Denmark, Department of Civil Engineering, Denmark;

[3]= Mid Sweden University, Ecotechnology, Sweden;

[4]= VTT, the Technical Research Centre of Finland, Renewable energy in buildings, energy efficiency, Finland;

[5]= Bolig Enøk AS, Norway;
[6]= Passiefhuis-Platform vzw., Belgium;
[7]= BBRI, Belgian Building Research Institute, Belgium

Available to download from: http://www.one-stop-shop.org/sites/default/files/New-business-models-for-holistic-renovation.pdf

ECTP-E2BA Eracobuild Conference, Warsaw 4-5 October 2011
http://www.ectp.org/warsaw2011.asp Erwin Mlecnik of PHP presented the One Stop Shop project and disseminate results so far to conference participants. Available to download from: http://www.one-stop-shop.org/sites/default/files/OneStopShopECTPConference_Mlecnik.pdf

Nordic Network Meeting organized as part of the conference Sustainable Buildings 2011 – October 18th, 2011, Helsinki. Attendees representing the One Stop Shop project: Trond Haavik (Segel, Norway), Irena Kondratenko (PHP, Belgium), Sanne Hansen (DTU, Denmark).

Dissemination to other conferences 2012 Retrofit Conference 2012, January 24-26 January 2012, Salford, UK. ***Paper (WP1, 3, 4 related):*** *"Developing an integrated offer for Sustainable Renovations"* Authors: Johan Cré1, Erwin Mlecnik[1,2], Irena Kondratenko[1], Pieter Degraeve[3], Joerie-Aleksander Vander Have[3,] Jeroen Vrijders[4,] Johan Van Dessel[4], Trond Haavik[5], Satu Paiho[6,] Sven Svendsen[7], Lies Vanhoutteghem[7,] Sanne Hansen[7]

[1]= Passiefhuis-Platform vzw,
[2]= Delft University of Technology, OTB Research Institute for the Built Environment
[3]= Vlaamse Confederatie Bouw
[4]= Belgian Building Research Institute
[5]= Segel AS
[6]= VTT Technical Research Centre of Finland
[7]= Technical University of Denmark - Department of Civil Engineering

Available to download from: http://www.one-stop-shop.org/sites/default/files/Developing-an-integrated-offer-for-Sustainable-Renovations.pdf

Passivhus Norden conference 21-23 October 2012, Trondheim, Norway "From low energy and passive houses to zero carbon and plus energy developments" ***Paper : (WP4 related)*** *"Guidelines for developing one-stop-shop business models for energy efficient retrofitting of single family houses"*. Authors: & Synnøve Aabrekk &Trond Haavik, [1,] Erwin Mlecnik [2,3],, Satu Paiho [4]

[1]= Segel AS
[2]= Passiefhuis-Platform vzw,
[3]= Delft University of Technology, OTB Research Institute for the Built Environment
[4]= VTT Technical Research Centre of Finland

Available to download from: http://www.one-stop-shop.org/sites/default/files/abstract-Paper-Passivhus-Norden-2012.pdf

SHC Congress in San Francisco, July 2012. Poster (WP3/WP4 related)

Paper and Poster (WP4 related) *"Collaboration opportunities for advanced housing renovation"* Authors: Erwin Mlecnik (PHP/OTB TU Delft), Trond Haavik (Segel). Published in Science Direct www.sciencedirect.com for SHC 2012. Energy Procedia 00 (2012 000-000. www.elsevier.com/locate/procedia Available to download from: http://www.one-stop-shop.org/sites/default/files/Collaboration-opportunities-inadvanced-housing-renovation.pdf

"From Demonstration Projects to Volume Market of Sustainable Construction" Authors: Trond Haavik (Segel), Erwin Mlecnik (PHP/OTB TU Delft), Are Rødsjø (Husbanken) Available to download from: http://www.shc2012.org

Passivhus Norden 2012 Conference, October 2012

Paper (WP4 related) *"Opportunities and barriers for business modelling of integrated energy renovation services"* Authors: Erwin Mlecnik (PHP/ OTB TU Delft), Irena Kondratenko (PHP), Trond Haavik & Synnøve E. Aabrekk (Segel)

International Comparative Urban Retrofit Workshop: Purpose, Politics and Practices. 13-14 September2012, Manchester, UK. ***Paper and Presentation by Erwin Mlecnik:*** *"One Stop Shop: Development of Supply Chain Collaboration for Integrated Housing Retrofit"* For the International Comparative Urban Retrofit Workshop: Purpose, Politics and Practices. Available to download from: www.one-stop-shop.org/sites/default/files/Urban-Retrofit-paper.pdf

Thematic Workshops

Workshop with "Success Families" project 20th October 2011 in Helsinki, linked to the 3rd consortium meeting to explore synergies and opportunity for collaboration, sharing of experience between the two projects.

Belgium

- 'Condetti workshop' 29th March 2011, as part of 3rd yearly congress of VCB (Flemish Building Confederation), Advise platform energy-efficient building and renovation, working group building envelope and air-tightness, held in Technopolis, Mechelen,
- 29th March 2011.The workshop focus on approx 50 contractors (joiners, insulation, air-tightness, windows and doors), divided into groups of 6-8 person who will work

together to create details linking joinery, insulation and air-tightness in renovation construction. OSS project presented to all by Johan Cre of Passiefhuis-Platform.

- 8th September 2011, visit to renovation project Roosendaal, The Netherlands for the User Group members and the OSS Group of SMEs. Presentations and visits to houses. The day is followed by the 2nd meeting of the Flemish User Group.
- National workshop (November 23, 2011) led by WTCB, in collaboration with TD DuBo project. Related to part of the WP1 concerning 'matrix' of problems/ solutions in renovation. Interactive workshop with participants with different profile (architects, builders, contractors..) who have some experience with house renovations.
- International Workshop: "Business Zoo", April 2012 on innovative business models (together with 3rd partners' International meeting), Antwerp. Key actors of the OSS from all partner countries to present. Event to be organized in a dynamic way (pitch-presentations/moderators, questions prepared in advance). Collaboration with European Enterprise Network.
- OSS Final dissemination event, 7th September 2012,Passive House Professional Day.
- Presentation of OSS project results Announcement of Course "Integral Renovation"

Denmark

Workshop with Danish construction organizations.

Finland

Finnish workshop in June 2011 dealing with the decision making tool based on system dynamics. It is a tool to make energy-efficient measures easier in renovation objects but it is meant for apartment buildings, not single-family houses.

Norway

- Suggestion of measures by National Authorities presented to Minister of Municipalities (responsible for Norwegian State Housing Bank) and for the chair of Committee for Environment and Energy of the Norwegian Parliament in January 2012.
- Presentation at a seminar arranged by the Norwegian State Housing Bank of business models and possible measures by the Authorities in February 2012.
- Workshops with Bolig Enøk (partner in the pilot). Focus on a) developing a model for physical energy efficiency center for hardware stores, b) developing a training program for involved actors and c) business model for "project managers".
- The concept of Bolig Enøk presented to a big audience October 2011 at the building and construction exhibition "Bygg Reis Deg" in Lillestrøm.
- Meeting with the minister resulted to a meeting at the ministry on 15th of March

2012 with a presentation of the preliminary results of the research project..

- Workshop with local companies at Nordfjordeid, Norway arranged as "Animal Gathering" (ref Business Zoo) on 19th of June 2012.

Articles in Professional Magazines

Available to download from: http://www.one-stop-shop.org/articles

Belgium

Project presented on: PHP website http://www.passiefhuisplatform.be and Newsletter (February 2011)

- VCB article Bouwbedrijf, May 2011 *"Enquête VCB Geïntegreerd aanbod energie-efficiënte technieken nog niet voor morgen"*
- VCB article in Bouwbedrijf, Juli-Augustus 2011, p.31 " *Integrated energy-efficiency technics not yet for tomorrow"* (Geïntegreerd aanbod energie-efficiënte technieken nog niet voor morgen").
- VCB article "*Bouwen aan Vlaanderen"*, No 1 2011 (Jan-Feb-March) p.66 " *Energy-efficient renovation still too fragmented"* (Aanbod energie-efficiënte renovaties nog te gefregmenteerd").
- BBRI article on Interactions in the renovation process *" Doorgedreven energetische renovatie: interacties tussen de bouwberoepen"* in WTCB-Contact (forseen in December 2012)
- Be.Passive Magazine November 2012 article *"Integrale renovatie = new big business"*

Norway

- Article published in the newspaper Østlandets Blad (OneStopShop/ SuccesFamilies), 23.11.11
- Project is planned presented on: www.lavenergiboliger.no , www.zeb.no , www.huseierne.no, and www.byggaktuelt.no Summer 2012
- Newsarticle in Norwegian covering the workshop event which took place on 19th of June in Nordfjordeid. To be downloaded from Segel's WEBsite. Summer 2012.
- Article in Byggaktuelt and similar magazines Summer/Autumn 2012
- Article on line in Norwegian *"Stort markedspotensial for rehabilitering til energieffektive bygg"* about SuccessFamiilies and OneStopShop http://www.husbanken.no/miljo-energi/nytt_miljoenergi/onestopshop/
- Television: coverage by NRK of Bolig Enøk's energy audit of single family house in Nordfjordeid on 18th of June 2012 (the day prior to the workshop event with local actors. http://www.nrk.no/nett-tv/indeks/308188/

Finland – on line publications:

- Energy renovation services for single-family houses
  Generalization and challenges of the one-stop-shop service model
  [Pientalojen energiaremonttipalvelut. Kokonaispalvelumallin yleistyminen ja sen haasteet]. Satu Paiho, Johanna Kuusisto, Olli Stenlund & Mia Ala-Juusela.
  Espoo 2012. VTT Technology 41. 62 p.
  http://www.vtt.fi/inf/pdf/technology/2012/T41.pdf
- Financial instruments for reconstruction and energy renovations of residential buildings in Finland
  [Rahoitusratkaisuja asuinrakennusten perusparannuksiin ja energiakorjauksiin].
  Jussi Rönty & Satu Paiho. Espoo 2012. VTT Technology 42. 56 p.
  http://www.vtt.fi/inf/pdf/technology/2012/T42.pdf

Denmark

- Paper for publishing in ELSEVIER - Building and environment or similar, as ISI papers *Renovation of artificial lighting whit LED in single family houses.*
  Authors: DTU, Danish Technical University: Christina Charlotte Skaaning, Svend Svendsen and Toke Rammer Nielsen
- Paper for publishing in ELSEVIER - Building and environment or similar, as ISI papers *Testing of method for energy renovation of single family houses on cases*
  Authors: DTU, Danish Technical University: Matilde Grøn, Svend Svendsen, Alfred Heller, (possibly also: Ulrik Christensen, Christoffer Marxen and Rene Knorborg).

Specific Dissemination in Flanders (Task Leader VCB) Involved: Flemish Partners

- PHP 1st meeting of the user committee 27th January 2011
- PHP 2nd meeting of the user committee 8th September 2011 and 'study trip to 'De Kroeven' Development,
- Roosendaal, the Netherlands (8 September 2011)
- PHP 3rd meeting of the user committee 14th March 2012
- VCB annual symposium 29th March 2011, PHP presenting at the workshop 'techniques'
- PHP presentation at the 'Transitiearena' 6th April 2011 Leuven
- 12de Isolatie Dag – Enegie prestatie gebouwen Recast EPBD, 20 September 2011 – Ingenieurshuis KVIV, Antwerpen; Presentation by Wouter Hilderson *"Bijna – energieneutraal bouwen - voorbeldprojecten"*, PHP, project OSS presented.
- National experts workshop *"Assessment of energy projects as an effective way for stimulating the supply side for better performance"*.
- One Stop Shop, Erwin Mlecnik, Flemish Passive House Platform, presentation. 16-6-2012. The Liaison agency Flanders-Europe (vleva) & the Flemish Building

Confederation (VCB) workshop *"Innovative practices guaranteeing an increasing energy efficiency in buildings"*. June 19th 2012, Brussels. The workshop is part of the European Sustainable Energy Week - EUSEW

- TC Ruwbouw WTCB & Federatie van Algemene Aannemers – Themadag Bouwknopen – De coördinatie van bouwberoepen vormt de basis voor een geslaagd bouwdetail.. – 23 oktober (Namen), 6 november (Gent), 13 november (Brussel)
- Presentation of the project, with focus on Interactions for Contractors for several WTCB-Technische Comités (Dakdichting, HVAC, ...)
- Energieplatform, City of Antwerp, presentation of One Stop Shop results, 28 September 2012 Ecohuis Antwerp, PHP Irena Kondratenko

Project Website http://www.one-stop-shop.org

- Draft website design presented to all partners (February 2011)
- Restricted area active, password/log in circulated to all partners (11-04-2011)
- Partners asked at 2nd International Meeting Copenhagen 13-14 April 2011 to: link the websites of their organizations to www.one-stop-shop.org and raise awareness of the OSS project via their newsletters.
- October 2011, OSS website updated
- August 2012 OSS website update

Possible continuation of One Stop Shop in sustainable renovation

A project proposal for the 2012 call of the Intelligent Energy Europe (IEE) was submitted in May 2012. The proposal uses some of the results of the OSS project and also represents possibility for continuation of the work on One Stop Shop for sustainable renovation. (decision on funding known in November 2012).

IEE 2012 SCoHR " Strengthening Collaboration for Housing Renovation"

project proposal. The objective of SCoHR is to strengthen collaboration of enterprises in innovative business schemes for realizing nZEB renovations in single family owner occupied houses. The project focuses on eliminating barriers for collaboration, providing enterprises with guidance on how to collaborate and developing services for the different market segments.

WP7 Project management

WP Leader: PHP, Belgium

The consortium had 4 meetings with the following schedule:

- Kick-off meeting 08/10/2010 Brussels, Belgium
- 2nd consortium meeting: 13-14/04/2011 Copenhagen, Denmark
- 3rd consortium meeting 19-20 October 2011, Helsinki, Finland
- 20th October 2011 common workshop with Success Families Nordic project
- 4th consortium meeting 19-20 April 2012 Antwerp, Belgium.

Full record of the minutes is available from the project Coordionator PHP.

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One Stop Shop

- "From demonstration projects towards volume market: innovations for one stop shop in sustainable renovation"

The overall project objective 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.

Nordic Innovation is an institution under Nordic Council of Ministers that facilitates sustainable growth in the Nordic region. Our mission is to orchestrate increased value creation through international cooperation.

We stimulate innovation, remove barriers and build relations through Nordic cooperation
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