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COHERENO
Collaboration for housing nearly zero-energy renovation

Barriers and opportunities for business collaboration in the nZEB single-family housing renovation market

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Abstract

Research was done in Austria, Belgium, Germany, the Netherlands and Norway as part of the Intelligent Energy Europe project, entitled “COHERENO - Collaboration for housing nearly zero-energy renovation” (www.cohereno.eu) to better understand the emergence of collaboration structures for nZEB renovation of owner-occupied single-family houses (SFH). The partners analysed experiences from various supply-side actors who recently engaged or intend to engage in such collaboration structures. Based on this research we detected key barriers and opportunities for collaboration and business model development in this market segment.

The research first determined insights from (emerging) national developments and on-going initiatives on the emergence of collaboration for nZEB SFH renovation based on literature study and an international workshop. Next, various supply-side frontrunners in the nZEB SFH renovation market were interviewed and each country organized a national workshop to detect barriers and opportunities.

It is observed that the supply side for SFH renovation is suffering from a severe image problem of lack of knowledge and trust, inefficient construction processes, insufficient quality assurance and communication difficulties with homeowners. Important barriers on the supply side are lack of knowledge, particularly understanding the necessity for and approaches of collaboration, and to address customer values. Also, there is a lack of capacity to absorb knowledge in small enterprises. There is a lack of connection to wishes from the demand side, such as providing confidence in professionals' experience, independent advice, tailored pricing and project management solutions.

The study found various opportunities to eliminate process and market barriers by collaboration. Various types of loose or formal collaboration structures for delivering nZEB SFH renovation appear in all countries and their experiences set the scene for further development. New types of actors emerge that offer integrated solutions to unburden the homeowner, such as specialised consultants, physical renovation stores, and project managers. A market shift is experienced towards including quality assurance and energy performance services. Policy actors and sector federations support this development, specialized networks are being formed and non-profit organisations offer customer portals with recommended professionals.

The study concludes that today's actor collaborations in the nZEB SFH renovation market are still largely suboptimal. Collaboration structures still need to develop sound business models that propose scenarios for customer segments, explore partnerships, develop quality assurance and integrate alternative financing methods.

1 Introduction

“Maybe the biggest barrier to sustainable construction today is the fragmented supply chain.”

Quote by Sigrid Strand-Hanssen, representing the perspective of the contractors on the European Commission’s 12th European Forum on Eco-innovation (EcoAP, 2012)

This report is established as part of an Intelligent Energy Europe project, entitled “COHERENO - Collaboration for housing nearly zero-energy renovation” (www.cohereno.eu). The main objective of this project is to strengthen the collaboration of enterprises in innovative business schemes for realizing nearly Zero Energy Building (nZEB) renovation in owner occupied single-family homes (SFH). Therefore, exploratory research was done in the partner countries Austria, Belgium, Germany, the Netherlands and Norway to better understand the experiences of existing and emerging collaboration structures for nZEB house renovation.

This report analyses relevant experiences from various supply-side actors who recently engaged or intend to engage in collaboration structures to realise nZEB house renovation. Furthermore, it proposes success factors to facilitate the business model development for collaboration structures. Success factors can lead to improved collaboration of actors, taking into account the need for quality assurance. To deal with key barriers for collaboration, detected solutions in partner countries are shown. Based on these results, recommendations for removing remaining barriers are proposed to endorse enterprises to step into collaboration.

2 A structured approach to identify experiences

2.1 Research questions

The general goal of the COHERENO project is to increase the potential for successful collaboration between contractors and other supply actors that are involved in nearly zero-energy building (nZEB) single family home (SFH) renovations. To support this general goal, it is the goal of this work to detect key barriers and opportunities for stepping into collaboration for nZEB SFH renovations and to identify characteristics of emerging supply-side collaboration structures (in this case innovators) that act similar in ways relevant to business modelling.

The main question that this research wants to answer is:

What are barriers and opportunities for enterprises to engage in collaborative business model development for nZEB SFH renovation?

This question was explored with three sub questions in five partner countries:

1. What are new insights from (emerging) national developments and on-going initiatives on the emergence of collaboration for nZEB SFH renovation?
2. What are current experiences of supply-side frontrunners in the nZEB SFH renovation market in the partner countries?
3. What are the main problems and solutions to step into (collaboration for) the market of nZEB housing renovation in the partner countries?

2.2 Research methods

The three sub questions were approached with various research methods.

To answer the first sub question, COHERENO partners from five countries (ÖGUT in Austria, PHP in Belgium, dena in Germany, TU Delft in the Netherlands, Segel in Norway) determined **current national experiences and developments**. The partners investigated national energy and innovation policy development in their country related to collaboration in the construction sector, particularly for nZEB SFH renovation. According to their involvement in European projects, they also explored the relevance of the results of previous projects, for example in the framework of European programmes such as ERACOBUILD, FP7 and Intelligent Energy Europe. Also, PHP, TU Delft and BPIE jointly organized an **international workshop** in Brussels, entitled 'Home Renovation towards Zero Energy: Who asks and who delivers' (16 October 2013, 39 participants), where experiences were presented and discussed with a wider audience. This information resulted in a discussion about the emergence of collaboration for the nZEB SFH renovation market.

To answer the second sub question the COHERENO partners each **interviewed supply-side frontrunners** in their country, related to different nZEB SFH renovation projects. To support these interviews, a questionnaire was developed by TU Delft, which covered various aspects (see Appendix). It mainly relates to the experiences of these frontrunners with setting up and engaging in collaboration structures. To structure the interview, questions were asked related to elements that are relevant for collaborative business model development, such as:

- The current key activities of the frontrunner for realizing an nZEB SFH renovation
- The key resources that are being used to realize such renovation
- The current key partners and the attitude towards future collaboration
- The attitude towards (specific definitions of) nZEB SFH renovation
- The attitude towards (specific items of) quality assurance being a key activity
- The focus on a specific customer segment of SFH-owners
- The development of key value propositions for SFH-owners
- The key customer relationships with SFH-owners
- The communication channels that are being used to address SFH-owners
- The (expected) revenue streams
- The needed knowledge, competencies and resources to engage in volume market development

These key items stem from theories of business modeling (Osterwalder *et al.*, 2005; Osterwalder & Pigneur, 2010), which is also used as a general guiding theory for the whole COHERENO project.

To answer the third sub question COHERENO partners organized a **national workshop with frontrunners** in their country. This workshop assembled selected individuals to discuss and comment on, from personal experience, the topic of nZEB SFH home renovation. External presenters from the supply-side showed inspiring national examples about successful nZEB SFH realizations and/or collaboration for realizing an nZEB SFH renovation. The COHERENO country partners then divided the participants into smaller groups and moderated a discussion per group. The first question that was addressed in each group was: What goes less well during nZEB SFH renovation? (..on the technical level? ..regarding collaboration?). The second question that was addressed in each group was: How can we avoid what goes less well?

The discussions were facilitated using a poster developed by VITO and translated by national COHERENO partners. This poster shows general issues of concern related to five building phases (diagnosis/ analysis, design/ planning, execution of works, hand-over, use phase), as determined from COHERENO research¹. Participants were motivated to discuss various items by using post-its. As a result of the discussion in each group top main problems and possible solutions were determined.

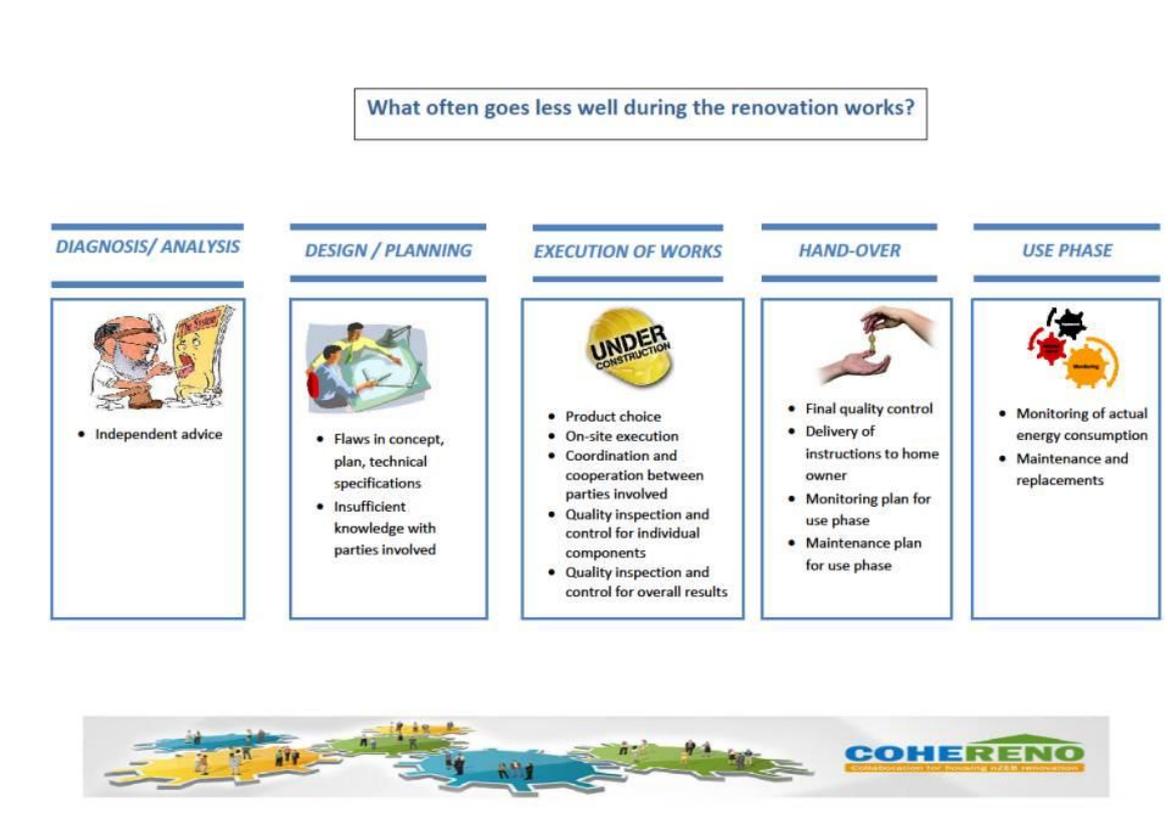


Figure 1 Poster on collaboration/ technical problems encountered in nZEB SFH renovation. This poster was used during the national COHERENO workshops with frontrunners.

During the workshop the participants were also asked to reflect on quality assurance and customer confidence (see Figure 2) and to fill in a questionnaire related to their use of quality assurance instruments. Results of this part of the workshop (quantitative analysis) are reported in a separate report on “Creating customer confidence through quality assurance” (D4.2). The discussion in this part also led to defining top three problems and solutions regarding customer confidence/quality assurance.

¹ See also the report on COHERENO Work Package 4 (D4.2).

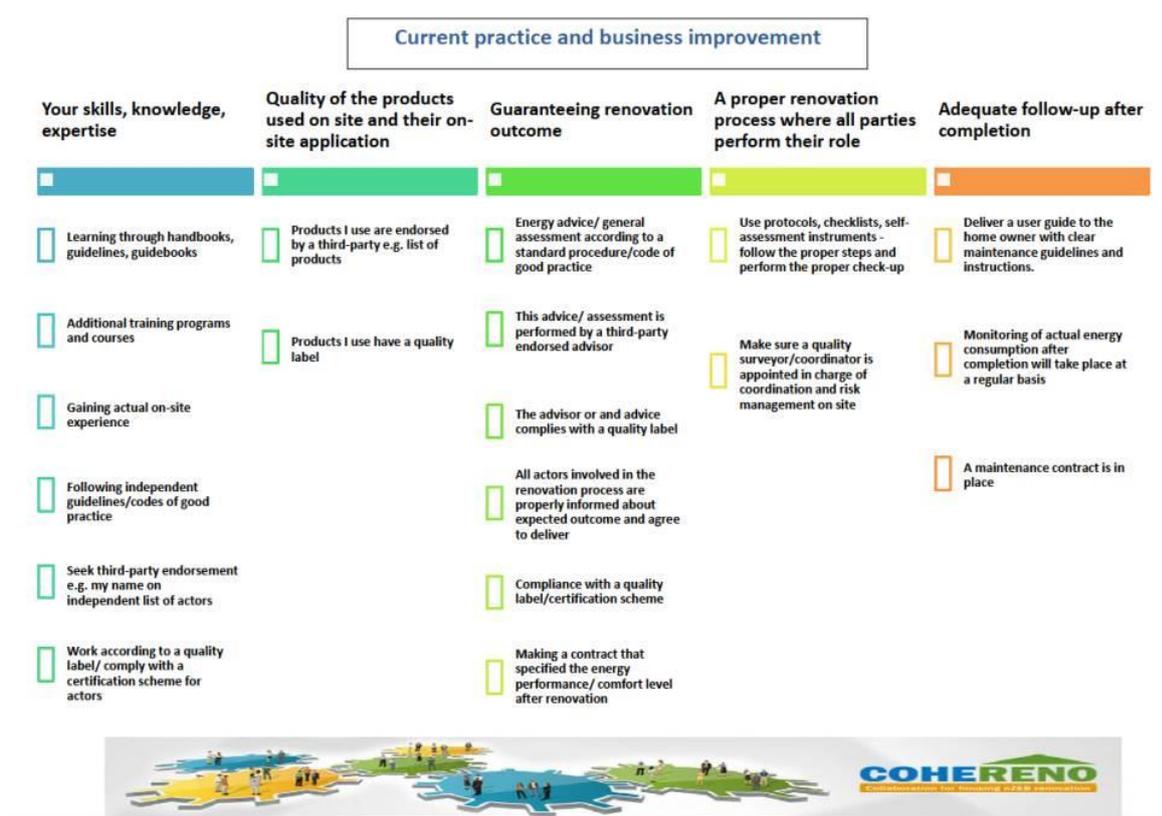


Figure 2 Poster on customer confidence/quality assurance used during the national COHERENO workshop with frontrunners.

After the reflections in various groups, exchange of experiences of the different groups was organized. The workshop was rounded up by an external observer.

Finally, to determine what partner countries can learn from differences and similarities regarding national barriers and opportunities, a **COHERENO partner workshop** was held in Vienna, 20 March 2014.

Before we present the results of the research, we will now first discuss the current situation in each partner country regarding developments to improve collaboration for nZEB SFH renovation.

3 New developments in collaboration for nZEB SFH renovation

3.1 National research developments and programmes

3.1.1 Austria

Research developments

In Austria, there are various research initiatives focussing on collaboration for nZEB SFH renovation as well as on customer segments of the demand side.

From 2009 to 2012 the research and consulting project ARGE EEE (Cerveny *et al.*, 2012) was dedicated to the development of service packages for thermal renovation of SFH that become widely spread and by thus contribute to the increase of energy efficiency and renewable energy use in the housing sector. This should be achieved by cross-company and inter-sectoral collaboration.

From the practical testing that took place in one province of Austria (see Example 1), one could derive some challenges for successful supply chain collaboration. According to the need of collaboration of different companies, one solution was the strict **avoidance of overlapping** on the part of the companies.

Example 1. Collaboration between a bank and an Energy Service Company²

A company responsible for planning, another responsible for execution and the third responsible for financing tried to collaborate. Originally the competencies of the two partners responsible for planning and execution were overlapping to a large extent, as the partner who should take over only the execution part, was also able and willing to offer planning services. On the demand side, one faced the problem that decision making processes on renovation projects take a long time. In addition, renovation requirements of SFH owners were very multifaceted and therefore it was difficult to bring them into agreement with service packages geared to thermal renovation only. Finally, a partner backed up and there remained only two partners with clearly defined tasks, namely a bank and an Energy Service Company (ESCO). The ESCO took over responsibility for both planning and execution and was cooperating with varying sub-contractors that offer different execution services, depending on the concrete requirements of the renovation projects.

This example shows that on the supply side, **the service portfolios of the companies should complement one another perfectly** and also **business cultures and corporate philosophies should be compatible**. The sticking point of cross-company collaboration is the development of business models that **ensure that energy savings become profitable** for companies and that enough flexibility is introduced to meet diverse requirements on the supply as well as on the demand side. And finally, the business models developed should have the potential to become standard service products within a few years.

The research project WoZuBau in 2012/2013 addressed the issue of a better understanding of the demand side for SFH renovation and identified by interviews and questionnaire a **lack of well-educated and experienced contractors** as well as the **need of independent energy advisors**. Special homeowner target groups were located, on which collaboration initiatives should focus, for example those who buy or inherit a building usually invest more money than those who have been living in the building for many years.

² See also 4.2.5 for further details

Early successful models on the supply side which combine efficient information and mobilisation of users with a comprehensive technical and ecological offer have been studied by Ornetzeder *et al.* (2005). The "Ökomodell Außerfern" in the Tirol and the network "Traumhaus Althaus" in Vorarlberg. Both of them are operating very successful on the local level for the promotion of thermal refurbishment. These models are characterised by intersectoral network structures constituted by heterogeneous local social actors, aiming at quality assurance to enable an attractive offer for homeowners.

National and local programs

The Austrian climate change initiative *klimaaktiv*, launched by the ministry for environment, consists of a training program for builders and plumbers and a best practice data base of energy efficient buildings. Graduates and **involved parties of best practice buildings are listed in a web based klimaaktiv map**³. Both offers refer to the klimaaktiv building criteria, which are part of the Austrian radar for nZEB renovations. The klimaaktiv activities match directly with the demand of customers for experienced actors in the different provinces and can be used by professionals to find potential partners for renovation projects as well.

Example 2. Consortium of companies

As a result of klimaaktiv, the HSP-Group (HausSanierungsProfis) in Lower Austria⁴ offers cross-company one stop services for energy efficient renovation. All of the eleven cooperation partners are 'klimaaktiv Kompetenzpartners', subject to the condition that the company regularly attends training courses in the field of energy efficient building. Members of the network cover the full range of renovation services like planning, execution and consulting like energy advice. Beside SFH Renovation the HSP Group offers renovation and construction services for companies and municipalities. The network is situated in the region Wagram-Tullnerfeld and has a total of 150 employees.

The HSP network puts a strong emphasis on customer confidence by offering a one stop service for energy efficient renovation. According to the network the main success factors to create customer confidence are flexible and innovative solutions, which are also affordable for homeowners. In order to offer competent consultation and guarantee a reliable job handling the partner companies endorse education and training as a key factor.

In February 2014 the Austrian Climate and Energy Fund started a green start-up competition to find and support green business ideas from the fields of renewable energy, energy efficiency and mobility. Accepted projects started the Business Concept Modelling in May with individual workshops and coachings.

Different local initiatives like the "Tiroler Sanierprofi"⁵ or the "The Green Building Cluster of Lower Austria"⁶ forces networks of the most innovative companies active in the area of energy efficient and sustainable refurbishment. They are supported by the energy agencies of the provinces and the chambers of commerce.

3.1.2 Belgium

Research developments

³ <http://maps.klimaaktiv.at/index.php?id=190&cat=2155>

⁴ <http://www.hsp-noe.at/>

⁵ <http://www.tiroler-sanierprofi.at/index.php?id=1>

⁶ <http://www.ecoplus.at/en/ecoplus/cluster/green-building>

Various supply-side collaboration issues for realizing nZEB SFH renovation were investigated by Passiefhuis-Platform, the Belgian Building Research Institute and the Flemish Federation of contractors (VCB), in the framework of the ERANET-ERACOBUILD-project 'One Stop Shop - From demonstration projects towards volume market: Innovations for sustainable renovation'⁷. This project investigated opportunities and barriers related to the market development of nZEB SFH renovation. The research included, amongst other, a contractor questionnaire and interviews with demonstration project stakeholders. The questionnaire led to the identification of various issues that contractors consider important regarding the stimulation of the nZEB SFH market development. They indicated strong preference towards **awareness rising of customers and companies** (see Figure 3).

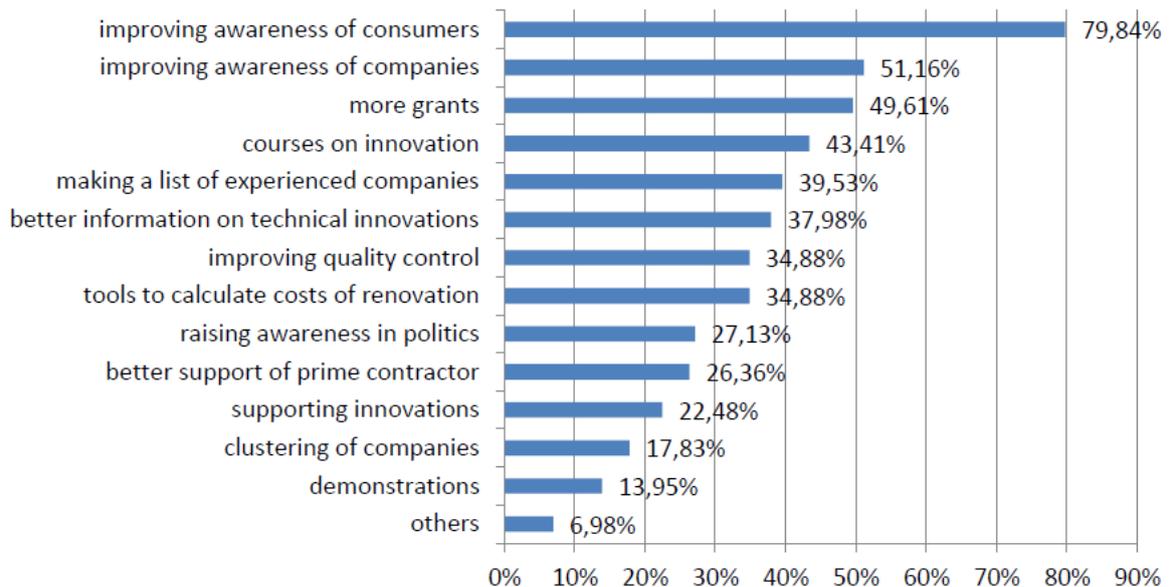


Figure 3 Answer to the question “What focus do you expect regarding the market development of integrated housing renovation?” (139 respondents/contractors; Belgium). Source: ERANET-ERACOBUILD One Stop Shop.

The interviews determined viewpoints from contracting actors engaged in nZEB SFH renovation. 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. Difficulties in adopting innovations could be related to **lack of collaboration between market actors**. The following issues were perceived as particularly problematic, **requiring process solutions** where better actor collaboration 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 barriers, an option was proposed to **lift up the level of knowledge of the craftsmen**. Also, the **systemic use of innovative whole building concepts** was found

⁷ <http://www.one-stop-shop.org>

useful, since this can lead to well-coordinated renovation modules with fewer companies involved.

The One Stop Shop project also resulted in defining actor categories that should work together, a proposition of **developing a One Stop Shop web portal** for integrated housing renovation, and to defining and testing a networking methodology for stimulating business collaboration for nZEB SFH renovation. A key observation in the project was that, in order to prepare for a growing market, companies must be aware that some customer segments expect **one single point of contact to take responsibility**, act as project manager, and ensure quality and efficient, rapid execution. Further results of this project can be found in Mlecnik (2012, 2013) and Mlecnik *et al.* (2012, 2013).

Example 3. Collaboration in a One Stop Shop

It is obvious that in a market where the rate of deep renovation is to increase, not all homeowners can be expected to coordinate the whole renovation process, to find all the information concerning deep renovation solutions and examples, to contact, contract and coordinate a range of individual craftsmen, to ensure quality while keeping costs and energy performance under control, and all the while managing the administrative burden and the uncertainty over financing the whole project.

One Stop Shops aims for reducing the complexity of the renovation process, providing one key responsible.

Key customer values of One Stop Shops are a less fragmented renovation processes and minimum hindrance and unburdening of the client. Furthermore, providing energy performance guarantees is sometimes part of the deal. One Stop Shops also open up perspectives for the effective use of electronic communication channels.

Few such collaborations exist (see Example 2 and Chapter 4) and substantial innovation is still needed on the supply side, especially regarding collaboration between different craftsmen and experts.

From 1 March 2014 the Flemish federation of architects (NAV), the Flemish contractor federations (VCB and Bouwunie) and the sector federation of consulting engineers (ORI) started a research project entitled 'Working in construction teams, an innovative process' (Werken in Bouwteams, een innovatief proces). This project is supported by the Flemish Agency for Innovation IWT and it aims to optimize construction processes by assembling various types of actors (clients, architects, engineers, key contractors) starting from the concept stage of a construction process. A **stronger attention during the design phase** is expected to streamline construction processes and to lead to reduced failure costs and better performance guarantees.

Example 4. Collaboration in construction teams

The 'construction team' concept is sometimes used in Belgium, but usually ad hoc, for example in Professional Project Services or Design-Build-Finance-Maintain processes. The happy few who have experience with construction teams are enthusiastic about their own learning process and results. However, they also recognize that expectations from various types of actors can shift in such construction teams. For example, contractors need to do more than calculation and designers need to do more than design. Also, the juridical aspects of construction teams still need some development and construction teams for home renovation are still rare.

National and local programs

In 2013, the Flemish Agency for Innovation IWT launched a ‘testing ground for home renovation’ (proeftuin woningrenovatie)⁸ to increase the market uptake of renovation for the whole housing stock. To obtain grants, this call specifically required the strong collaboration of various types of actors in the supply chain (suppliers, designers and contractors) to achieve **integrated quality solutions that are reproducible, up-scalable and affordable**. The aim of this call is also to reinforce the demand side using a group-oriented approach and **alternative financing methods**. Accepted projects will start around May 2014. This means that in the near future various collaboration structures will emerge in Belgium based on real projects and renovation processes. The processes will be documented by a knowledge platform.

Various municipalities engage in offering advice on eco-construction to homeowner. For example, the city of Ghent introduced this in 2008 and was surprised by the interest in it: the local building sector could not respond to the demand, e.g. due to the lack of the required skills (EcoAP, 2012). The city of Antwerp does this as well and to cover the demand the city collaborates with two non-profit organisations, one specialized in ecological construction (VIBE vzw) and one in highly energy efficient construction (Passieffhuis-Platform vzw). Brussels Environment has developed a very successful programme for the **promotion of sustainable construction** in the Brussels Capital Region (Hermans *et al.*, 2012). Architects collaborating in these projects assembled themselves in an informal structure to exchange experiences and knowledge. In the Flemish Region, Verdonck (2012) concluded from interviews that the energy performance level is a trigger for innovation, as is sustainable and ecological building. Verdonck (2012) also noted that open innovation can result from cooperation on site, cooperation between manufacturers of building materials and technology, or from a combination of cooperation on site and cooperation between manufacturers. **Protecting in-house knowledge** is considered the main barrier to cooperation between firms and extra barriers were noted for small firms (Verdonck, 2012).

3.1.3 Germany

Research developments

Since 2003, the dena-project “Efficient House Pilot Project” researches the potential to save energy in buildings. Pilot projects benefit of a special financial support: the German reconstruction loan corporation KfW grants subsidies higher than regular ones to participating homeowners. The dena-project aims to 1. Define high standards for new and refurbished buildings, 2. Try to reach high renovation standards, 3. Generate applicable and economic recommendations – to further development of political instruments and financial support possibilities, 4. Introduce high energy-efficient standards in the market.

The results until now are considerable. More than 400 buildings (residential and non-residential) were renovated in the context of this project. These are best practice examples and show good comfort. Refurbished residential houses came below 45 percent of the requirements for new buildings in the Energy Saving Ordinance (EnEV, 2014) and reduce CO₂ emissions by 3,7 millions of tons a year. The pilot projects inspire other homeowners and stimulate to pursue energy-efficient measures. The dena-project shows that in existing residential buildings, final **energy demand can even be reduced about 80 percent**.

The study shows that energy saving potential in the German building sector is still huge. About 90 percent of energy consumption for domestic buildings in Germany goes to heating and hot water. The largest share of energy consumption in German buildings with 41 percent is found in SFH. About three quarters of domestic energy consumption is lost through walls,

⁸ <http://www.iwt.be/subsidies/proeftuinbouw>

windows, the roof, doors or floors. Furthermore old and oversized boilers, incorrectly set and inefficient circulating pumps also use a lot of electricity and heat consumption is soaring. Existing buildings need better insulation and inefficient heating systems must be replaced by modern facilities. Only a few possibilities to renovate exist because of financial and economic reasons of homeowners.

For successful exploitation of this potential **supply chain collaboration** is considered very important. But at the same time **customer demand** for integrated renovations has to be stimulated by implementing **public awareness campaigns by the government**. **Quality assurance** of energy advice and during the construction process is very important.

National and local programs

An important initiative of the Federal Ministry of Economics and Energy, the German reconstruction loan corporation (KfW) and the Federal Office of Economics and Export Control (BAFA) is the creation of the Database Energy Efficiency Experts for Government Subsidy Programmes (Energieeffizienz-Expertenliste für Förderprogramme des Bundes)⁹. The **experts (energy advisors) have to be registered** in this database to confirm eligibility of energy-efficient buildings and renovations.

Example 5. List of qualified experts

With this official list of experts quality of energy advises and of energy-efficient building and refurbishment should be guaranteed. For homeowners this database simplifies searching for such experts in their region. Experts can register in this database if they can provide evidence for their knowledge in the field of energy efficiency. Every two years registered experts have to maintain their further education.

One of the subsidy programmes, the programme 431 "Energieeffizient Sanieren – Baubegleitung", concerns planning and monitoring of energy efficient renovation of residential property. The KfW pays 50 percent (max. 4.000 Euros) of costs for planning and for an **independent person accompanying the construction process** of the energy efficient renovation supervised by a qualified expert.

In 2012 another important competition was the "Energy efficiency house plus in old buildings" initiated by the Federal Ministry of Transport, Building and Urban Development and the NUWOG Wohnungsgesellschaft of the City of Neu-Ulm. Interested teams of universities were asked to **renovate** four blocks of flats **to the standard of plus energy houses**. All in all 14 teams participated. The renovation was finished in 2013. For the following two years the refurbished houses will be monitored. These buildings should be an example for housing companies as well as for private homeowners.

Regional refurbishment networks contribute to quality assurance. Many networks are working in the frame of vendor independence and product-neutral energy advice. In those networks architects, engineers, craftsmen, producers of building materials, and so on, cooperate. They offer bundled competences for energy efficient renovation. Good examples for existing and successful working regional refurbishment networks are Energie- und Umweltzentrum Allgäu (eza) and Energiekonsens Bremen.

An important campaign to inform homeowners and to gain customer demand in energy efficient refurbishment is "Die Hauswende". It is initiated by the "Allianz für Gebäude-Energie-Effizienz" (geea) (Alliance for Building Energy Efficiency), a cross-sector association of

⁹ <https://www.energie-effizienz-experten.de/>

representatives of industry, research, crafts, planning, trade, energy supply and finance. The campaign informs and imparts contact to regional persons in charge. All relevant federal ministries support “Die Hauswende”.

3.1.4 The Netherlands

Research developments

In his study on diffusion of highly energy efficient housing in the Netherlands, Mlecnik (2013) detected a **need for collaboration of actors in networks**. Also, it was discussed that there is still **insufficient learning from demonstration projects and homeowner’s experiences**. Also, improved quality assurance schemes and specific change agents for SME’s were recommended for highly energy-efficient housing. Based on his research from three perspectives (experiences of enterprises, homeowners and policy actors), Mlecnik concluded with the proposal of an approach to increase adoption of highly energy-efficient housing, as illustrated in Figure 4.

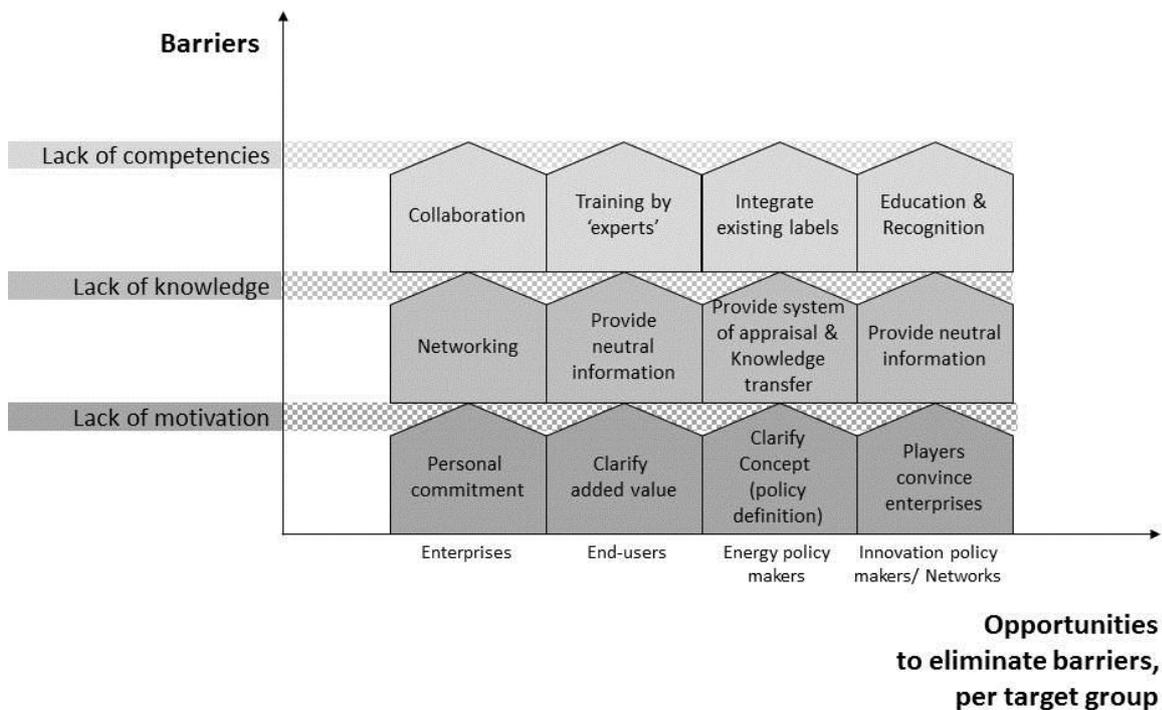


Figure 4 Integrated approach to eliminating adoption barriers for highly energy-efficient housing. Source: Mlecnik, 2013.

Roders *et al.* (2013) investigated the experiences of seven collaborations between housing associations and general contractors. These actors belonged to a small group of forward looking parties experimenting with partnering in construction. To participate in the knowledge exchange project the participants had to carry out a pilot project in housing refurbishment in

a partnering approach. In part of the cases the general contractors formed a supply chain or network with specialised contractors, consultants and architects. This resulted in **collaboration in Design-(Bid-)Build structures**. One can speculate that similar collaboration might occur with (groups of) owner-occupants commissioning a home renovation.

Diepenmaat et al. (2012) learned that actors tend to collaborate in order to realise a certain product. However, to reach sustainable innovation, companies need other competencies that they sometimes do not have. Next to improving the effectiveness of a product, they should also **improve the efficiency of the process and the customer intimacy**. Diepenmaat et al. (2010) mapped certainty (compare: quality assurance), simplicity of solutions, possibility of choice, previous experience of homeowners (for example study trips) and the supply actors' action perspective (with clear deliverables) as important success factors in order to address the homeowner.

National and local programs

Initiated by the Dutch Ministry of the Interior and Kingdom Relations and financed by the Innovation Agenda Energy and the organization Platform31 carries out a policy programme entitled 'Energy Leap' (EnergieSprong)¹⁰ for the built environment. This programme aims to develop the market by the **use of experiments and deals**. Within this programme several projects and campaigns address the collaboration of market players and the uptake of energy measures in home renovation by housings associations and private home-owners. Energiesprong targets the demand side with a web **portal to stimulate homeowners** and a **bottom-up public campaign**. Also, **municipalities are encouraged to take the lead** to stimulate home renovation.

The Energy Leap action 'House full of Energy' (Huis Vol Energie) provides a portal for owner-occupants to exchange information about ambitious home renovation. In a brochure Huis vol Energie elaborates on **three approaches towards customers** for renovating existing single family homes (SEV Energiesprong, 2011):

- Modern comfort (Modern comfort)
- Nature House (Natuurhuis)
- Smart done (Slim gedaan)

'Modern comfort' uses advanced technologies and a modern interior to realise a comfortable and stylish house. The main energy source is the sun. The 'nature house' approach is inspired by the earth. Ecological materials and solutions are being applied to save a lot of energy. The remaining energy needs are produced by biomass and the sun. The approach 'smart done' is meant for households that want to go a zero energy level step-by-step, eventually DIY. Simple, cost-effective and easy to install solutions are combined in a strategy that leave alternatives for the future. The three strategies are underpinned with energy simulations and calculations of all solutions being realised in two reference types: a semi-detached house built in the '70' and a terraced house built in the '60.

The public campaign 'Our Home Deserves It' (Ons Huis Verdient Het) aims by support of home-owners convincing the central government, banks and builders to remove obstacles in the law, financial constructions and to deliver qualitative, guaranteed and affordable renovation supply.

¹⁰ <http://energiesprong.nl/>. The program will end December 2014.

Within the Energy Leap programme the Action Program 'Locally all lights on Green' (Lokaal Alle Lichten Op Groen) stimulates six municipalities to make at least 20 existing houses energy neutral. This is expected to lead to events and deals with local suppliers and owner-occupants in order to renovate a larger amount of homes.

Until now this action was mainly effective in stimulating collaboration between housing associations and municipalities. Only one municipality developed actions for SFH owner-occupants.

Energiesprong also addresses the supply side and this includes the facilitation of **physical stores** where clients can buy (parts of) a renovation, and a **covenant with major companies** in order to eliminate energy bills in renovations.

Example 6. Renovation stores

In 2013-2014 in the Netherlands a competition was organised to open Renovation Stores that can offer integral energy saving solutions to private home owners. Seven winning concepts got money and support to develop their idea and to open the stores in June 2014 at the latest. You can find examples further in this report.

The 'Acceleration' Program (Stroomversnelling) is a continuation of the program Smart & Fast (Slim & Snel¹¹) and targets both the public¹² and the private sector to deliver '**energy bill = zero**' renovations.

Example 7. Covenant with major companies

The Stroomversnelling for the private sector is targeting the refurbishment of owner-occupied single-family dwellings according to the 'Energy bill = 0' principle. Consortia of builders, architects, product suppliers and other professional actors are challenged to make renovation proposals for energy bill = 0 renovations, to be realised in ten working days and an investment of maximum 45.000 Euro (including VAT). Meanwhile, municipalities are asked to choose neighbourhoods with reference housing types that could be renovated. In a few years we will know if they succeeded to deliver the proposition.

'More with Less' (Meer met Minder)¹³ is a covenant signed by the central government, building sector organisations and the umbrella organisation of housings association Aedes to create a market for energy efficiency in buildings.

Example 8. Covenant with sector federations

In practice Meer met Minder (MmM) is directed to private building owners and steered by the sector organisations Bouwend Nederland (contractor federation) and UnetoVNI (installer federation).

¹¹ Slim & Snel was aimed at two breakthroughs. First creating innovative renovation concepts for the Dutch social rented sector. Second, innovative collaboration processes between different stakeholders in the Dutch construction sector.

¹² The Stroomversnelling for the public sector is a covenant between a consortium of four major construction companies and six housing associations that they will carry out the refurbishment of 11.000 dwellings until 2016 according to the 'Energy bill = 0' principle, meaning that the refurbished dwelling has such a high energy performance that the energy bill will be reduced to zero. In addition, the agreement includes an 'upscale' phase, where 100,000 dwellings of housing associations will be refurbished by the consortium until 2020. In this project not only the high energy ambitions are innovative, but also the consortium approach and the financing structure, as to finance the energy measures, the renter pays the money they save on energy costs to the housing associations.

¹³ [http:// www.meermetminder.nl](http://www.meermetminder.nl)

The MmM organisation has developed an online 'one-stop-shop', an education program for suppliers and a registration system for the tradespeople. All MmM suppliers work according to the same step-by-step plan.

MmM is not directed at whole house renovation but especially the implementation of single measures. In 2014, MmM implemented a qualification scheme for the tradespeople/firms (Meer met Minder, 2014). This scheme holds also an assessment by clients.

Furthermore, in the Netherlands various collaboration experiences have been built up in the programme 'Block by Block' (**Blok voor Blok**). The Rijksdienst voor Ondernemend Nederland (RVO) carries out the knowledge and learning program Blok voor Blok in 14 local projects. Market players, municipalities, provinces and housing associations and other parties aim to make significant energy reductions of 1,500-2,000 dwellings per municipality. Until now about 15.000 living units have undergone an energy renovation and by the end of 2014 about 20.000 units will have been renovated. The project Blok voor Blok experienced that it is feasible to address energy renovation for rented social housing (as long as investments are foreseen by housing associations), but also that **a uniform approach is not possible** in the privately owned sector as homeowners need custom-made solutions according to their own needs and wishes. The **highest demand was generated from bottom-up initiatives**, via neighbourhood ambassadors, local communities and other existing structures. The projects in the private owned sector were considered cost-ineffective because it takes a lot of time to approach and convince homeowners. Actors that worked in this field did so to bind clients and/or because of financial arrangements by local authorities. The construction and installation companies did not actively create demand, but waited for offers (RVO, 2014).

Furthermore, there are various Dutch networks and knowledge centres that try to inspire their members to engage in new forms of collaboration. Initiatives include for example:

- Vernieuwing Bouw¹⁴
- Actieagenda Bouw¹⁵
- Platform Ketensamenwerking Woningbouw¹⁶
- GreenMakeOver (private initiative)
- MVO Nederland (Corporate Social Responsibility Netherlands)¹⁷
- Netwerk Bouwen NH2.0
- Municipal and Province programs like SlimWonen (not being part of Lokaal Alle Lichten op Groen)

3.1.5 Norway

Research developments

The joint Nordic research project **SuccessFamilies**¹⁸ studied the business environment with the aim to find ways to speed up the implementation of sustainable renovation of SFH. A few existing business models for a more or less holistic approach for renovation of SFH were studied. The company Bolig Enøk AS was found to set an example as being the first to offer an integrated and energy efficient renovation of SFH in Norway (see Example 9).

¹⁴ <http://www.vernieuwingbouw.nl>

¹⁵ <http://www.actieagendabouw.nl>

¹⁶ <http://www.ketensamenwerking.nl>

¹⁷ <http://www.mvonderland.nl>

¹⁸ With VTT in Finland, Danish Technical University, Mid Sweden University and Segel AS in Norway as partners. Project period: 2009-2012; <http://successfamilies.vtt.fi>

To better understand barriers and opportunities for collaboration a workshop was organized on November 22, 2010 as part of the SuccessFamilies project by the international partners and with participation of important Norwegian stakeholders such as the Norwegian State Housing Bank, Enova (the Norwegian energy efficiency body), the Norwegian House Owner Association, representatives from the association of construction companies, from a hardware store and from Bolig Enøk AS. Some of the conclusions from the workshop were that companies need to **understand the necessity** for collaboration, the **customer value** side aspects and the **role of different actors** in collaboration. Homeowners were found to have an attitude against climate change arguments (why me?). Authorities do not show the way and the demand is also not stimulated because there are no subsidies. The workshop found that the demand can be increased when **stimulating energy-efficiency measures, comfort-related aspects and very good examples**. Supply side actors were recommended to **use simpler and better marketing** ('productify' their offer), to **address public carrots**, to **develop certified services** and to **use energy auditors as experts** showing the way to clients. Generally it was understood that the Norwegian sector was at the start of developing collaboration structures for SFH renovation and therefore a focus is needed on the innovators.

Regarding the demand side, after the workshop it still remained unclear how people can be targeted that are not already renovating. There seems to be a big gap¹⁹ between the ordinary homeowners and the "early-birds". Yet it was considered that other sales issues except energy-savings touch people's hearts. Also, energy renovations do not seem to influence the price of a house in Norway, as the value is still mainly determined by location.

As for the supply side, it was obvious from the workshop that **today's business models in the construction industry are suboptimal** and that completely new solutions are needed beyond the incremental services that are now being offered. The service-providers need the demand now. A clear plan needs to be developed to attract homeowners (step by step).

Lack of capacity and knowledge in individual companies is a barrier and it takes time to get new services up and running. Therefore **authorities were recommended to define goals and support schemes for high ambitions**, for example by requiring an integrated energy plan connected to energy labelling for each house. It was found that the building sector is already ready to start with close co-operation between companies offering solutions and researchers having the latest knowledge. This offers good chance to renew the whole building sector.

The experiences from the SuccessFamilies project (see also Mahapatra *et al.*, 2013) were also brought into the ERANET-Eracobuild project One Stop Shop (see description in the Belgian section, further information see Haavik *et al.*, 2012). As part of the One Stop Shop project the Norwegian frontrunner Bolig Enøk developed its business model.

Example 9. The consulting project manager

The idea of Bolig Enøk AS was to offer an integrated renovation service as project manager. To do this they acquired all subcontractors for the specific job. The original company revenue model was to take a fixed percentage of the total contract amount. As this meant that the company had an economical incitement to increase the total prize of the projects, they later changed this model. Today the company has two main activities. On the one hand, the company is a project manager who works on behalf of the homeowner and who is paid as "consultant": all invoices from the suppliers are paid directly by the owner. On the other hand, the company offers training programs for contractors, employees in hardware stores and homeowners.

¹⁹ For example only 8,8% of the homeowners know about Enova.

National and local programs

The experiences from the two research projects have been presented to Norwegian authorities at top level: the Chairman of the Energy Committee in the Parliament, the Minister and the administration with the responsibility for housing, key persons in the Norwegian State Housing Bank and Enova - a public enterprise that is owned by the Ministry of Petroleum and Energy. The main recommendations given in 2012 to the authorities were:

- Launch a grant to homeowners for buying an energy audit make it mandatory to have such audit in order to get any type of incentives for measures on the house.
- Make it mandatory to use a professional to issue an energy label certificate (today the owner may do it in a simplistic way on the web)
- Change the grant system from today where it is possible to get subsidies for single measures and instead motivate to implement more holistic solutions.
- Define operational goals and increase dissemination of knowledge to craftsmen.
- In the event of a new future financial crisis use targeted measures for energy efficiency instead of general financial means to start recovery of the national economy.

From January 2014 Enova launched a new subsidy program which included a **grant of 50% of the costs to homeowners who buy energy audits**. It is a prerequisite that the audit is executed by one of the **auditors certified** by Enova and listed on their web site. Enova has also introduced a funding program for home owners upgrading the buildings to the Norwegian low energy standard or passive house standard (highest grant).

In order to spread competence to the employees in contractor companies, it is expected that the program called Lavenergiprogrammet²⁰, which was launched in 2007 as a joint 10 years project between national authorities and the construction industry, will deal with supply side issues. The aim of the program is to increase the knowledge among planners and craftsmen about energy efficiency and renewable energy in buildings.

3.2 International Workshop ‘Home Renovation towards Zero Energy’

In the framework of the IEE COHERENO project an international workshop “Home Renovation towards Zero Energy: Who asks and who delivers?” was organized in Brussels on 16 October 2013. The goal of this workshop was to explore key issues that allow the development of structures for collaboration between actors that are involved in delivering nearly zero-energy buildings (nZEBs). Amongst other, Benjamin Clarysse from Bond Beter Leefmilieu Vlaanderen explained novel approaches towards **listing of professionals in customer networks** in Europe and Marianne Nevens from Platform 31 presented the ongoing collaborative deals and experiments for nZEB home renovation in the Netherlands (illustrated in the previous section for the Netherlands).

3.2.1 A European campaign towards homeowners

Bond Beter Leefmilieu is an umbrella organization for more than 140 environmental groups and NGOs in Flanders. Amongst other it is setting up projects and campaigns to change human behaviour in a more sustainable way for several target groups. They organize the Ecobouwers Open House Days with which they want to inspire future builders and renovators by showing them concrete examples of energy efficient and sustainable houses.

²⁰ <http://www.lavenergiprogrammet.no>

The open doors campaign is now also being transferred throughout Europe within the framework of the IEE project²¹ NZB2021. Two NZEB Open Doors Campaigns are launched in 9 countries in 2013 and 2014 and study tours for decision makers are organized in 2014.

In Open House Days the enthusiasm and motivation of environmental conscious builders for high energy efficiency is effectively transferred to other persons who have plans to build or renovate their house. The full Ecobouwers campaign is independent and non-commercial and includes a community website²² with blogs, forum, good examples, workshops with low threshold for participants, real life open houses once per year and listing of recommended professionals. A balance is sought between large scale (>100 houses) and putting frontrunners in the picture. The campaign focusses on the house owner/builder. He tells the story: “what, how, why” in a not too technical way. The campaign is very successful and repeated every year. In 2012 156 houses were listed, more than 3,500 on-site visitors and more than 1.000.000 website visits were counted. 94% of respondents considered campaign valuable and informative and 78% of visitors are building, renovating or have plans to do so.

Considering collaboration with companies it is remarkable that – connected to the open houses - 1228 building professionals have already been listed publicly in Flanders. They can register themselves or they can be put forward by Ecobouwers exhibitors. Various types of professionals are listed (see Figure 5). The professionals can be connected with various demonstration projects (see Figure 6).

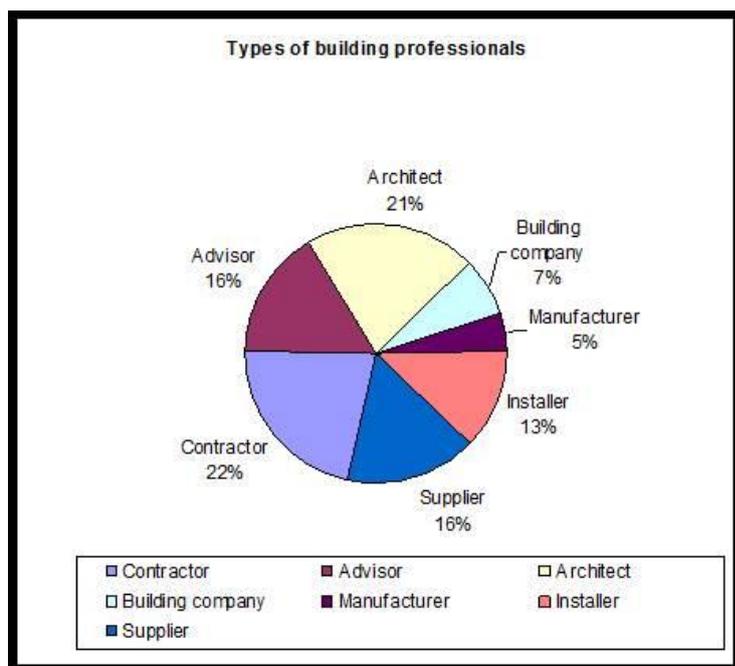


Figure 5 Types of building professionals listed in the Ecobouwers campaign (new construction and renovation).

²¹ <http://www.nzebopendoorsdays.eu/>

²² www.ecobouwers.be

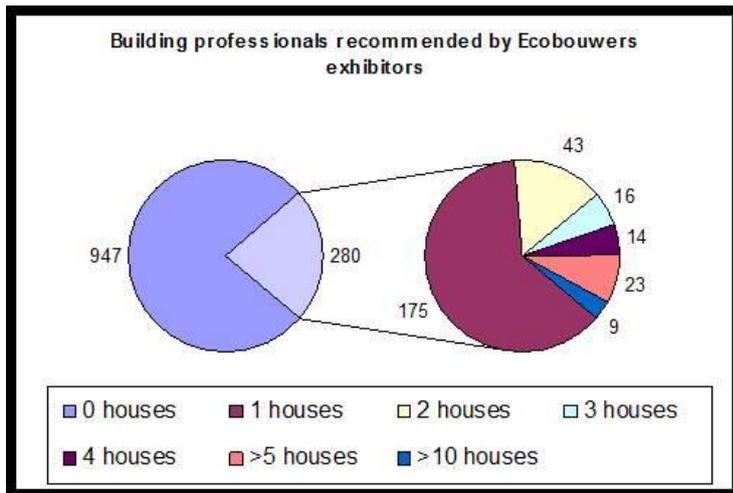


Figure 6 Number of demonstration houses connected to professionals in the Ecobouwers website.

Example 10. The customer portal with recommended professionals

In the Ecobouwers website homeowners provide data about their Open House project and only refer to professionals that they consider to have delivered quality/confidence. Ecobouwers.be is an important reference for homeowners with > 1 million visits/year: professionals that are being ‘accepted’ by clients thus benefit from free visibility and advertisement during Open House Days. Even, the more NZEBs they refer to, the better the ranking of the company in search results for homeowners (see Figure 7).

Bouw met de Ecobouwers.be professionals

Ze hebben hun ervaring met lage-energiebouw al bewezen en worden bovendien volledig onafhankelijk door de openstellers van Ecobouwers Opendeur aangeprezen! Je kan via het profiel van de bouwprofessional hun woningen in detail bekijken. In kolom * zie je alvast hoeveel realisaties van hun hand terug te vinden zijn op www.ecobouwers.be. Je kan ook nagaan of ze lid zijn van Passiefhuis Platform of het VIBE label in de wacht gesleept hebben. Op de site van REGent vind je specifiek professionals die actief zijn in het Gentse, een volledig overzicht vind je op www.ecobouwers.be

Provincie: PHP lid: VIBE label:

Naam:

Categorie: Architect Aannemer Adviseur Bouwbedrijf Installateur Leverancier Fabrikant

Activiteit: Isolatie en Lucht dichtheid Ventilatie Verwarming en Zonwering Buitenschrijnwerk Regenwater Duurzame energie Bouwmaterialen

Isolatie: Hellend dak Plat dak Muren Vloer

Buitenschrijnwerk: Hout FSC gecertificeerd hout

Trefwoord:

Naam	Type	Gemeente	PHP lid	VIBE label	# woningen
Eurabo	Leverancier Fabrikant	Ronse		***	25
Ludwig Van Wonterghem - S...	Leverancier	Kuurne			19
Hans Delannooye	Adviseur Installateur Leverancier	duffel		***	17
Denc-Studio	Architect Adviseur	Gent			16
IADR Bruno Deraedt	Architect	Gent		VIBF erkenning	16

Figure 7 Screenshot website ecobouwers.be: search module for homeowners with listing of professionals ranked according to number of projects they contributed to.

Also search results mention the type of the company, its location and if the companies that were involved in projects are a member of non-profit organizations that focus on energy-conscious or ecological construction (such as PHP and VIBE in Flanders). Contact details of the companies can be retrieved by clicking on the company name.

3.2.2 Discussions during the workshop

The presentations were followed by a discussion about the supply side concerns. In this workshop knowledge was obtained for the housing renovation sector, especially nZEB single-family owner-occupied housing renovation which is characterized by small renovation works, laymen and micro, small and medium-sized enterprises. Compared to section 3.1, some additional experiences and trends to promote collaboration in the construction sector were found.

The workshop found that it is still important in this phase to stick to ‘fans’ of nZEB renovation. In most regions credible, tangible examples are still needed to convince homeowners. It was also expressed that the marketing that works on social housing might not work for SFH and that both segments move at a different speed. Companies were recommended not to speak about ‘projects’, ‘investment’ or ‘packages’ – which have a connotation of ‘burden’ -, but about ‘improvements’, ‘immediate returns’ and ‘offer’. Quality assurance measures before and after renovation were considered important to gain customer confidence Energy performance contracting was seen as a way forward.

The attendees agreed that there is a need for independent parties (non-profit organizations, municipalities, and so on) in order to attract the homeowner to consider nZEB renovations. **Plans are needed on a municipal level** to work out concepts for the market. For example, the municipality of Rotterdam organizes courses for energy saving in homes and then asks what homeowners need and brings them in contact with intermediates or experts. In The Hague a ‘bureau’ was organized for homeowner associations where they can find answers from independent parties. In Antwerpen, the municipality offers homeowners free consultations with energy and sustainability advisors. **Home-owners have to be facilitated to find the right companies. Authorities can also stimulate high ambition.** For example, in the Netherlands companies are challenged to renovate houses in 10 days to guaranteed zero-energy for the price of the current energy account (for a total investment of about 40.000 EUR, split in monthly ‘energy bundles’). The Province of Gelderland installs a revolving fund to start such initiatives.

Summarizing the results of the workshop the Flemish Building Confederation acknowledges that there are **three main challenges: finance, quality and collaboration**. The affordability of the renovation is a key issue that needs to be eliminated with good communication with banks, installing pay-back capacity and innovation financing. Also, there might be a problem due to attract older homeowners to invest in renovation: this increases the inheritance tax. Considering quality issues, there are available labels that can be used, but a problem is that there are many labels which make the situation for the homeowner confusing. Regarding collaboration, clear plans are needed to share responsibilities and to determine financial liability of companies (which is ultimately an insurance issue). It is important to involve frontrunners in a whole-system approach. Companies usually gain interest in using energy performance contracts, if they can also be involved in the maintenance part: this is difficult to organize in the private sector.

The workshop showed that it is clear that the role of building parties will change. On the one hand, the workshop illustrated that the **contractor can be a key responsible** actor for nZEB renovation when trusted by the customer, but that it still remains a challenge for contractors to establish collaborations with other types of actors. While micro-enterprises observe

difficulties to take a leading role, somewhat larger companies see the business. On the other hand, **consulting and informing actors are establishing new forms of collaboration structures** with or without formal engagement of contractors. In general the attendees observe that real **estate agents, financing actors (banks, ESCO's, insurance companies), policy actors (grant providers, group facilitators) and non-profit organizations (customer portals)** can influence volume market development and should be more involved in collaboration structures. Better **quality assurance** was proposed as a way to gain customer confidence. **Peer-to-peer communication** (for example Open House Days) and recommendation (for example a public list of 'recognized' professionals) between homeowners can be very helpful to develop processes for nZEB renovation.

3.2.3 Business idea development during the workshop

After the workshop a business model generation workshop was organized in small groups with attendants of the workshop. This resulted in describing some additional ideas for collaboration structures. Mimi Slauerhoff from energy advice office Stepsto proposed a business idea for "kitchen table talks" for nZEB SFH renovation. Henk Wegkamp (contractor Dantuma Wegkamp) proposed to work with an independent "institute for energy renovation".

Example 11. The nZEB renovation advisor

The company is responsible for consulting and planning, and another company is responsible for execution. The company consults face to face in an independent manner ('kitchen table') according to the need of the homeowner. This can for example be realizing an individual saving potential, or the wish to live a more sustainable lifestyle, or the dream of a prettier home. The independency of the consultant builds the necessary trust in the service. Having a dialogue with the client further forges the customer relationship. The main communication channel for the company is mouth to mouth advertising, where previous customers reference the service to family and friends. Apart from knowledgeable and trustworthy consultants, resources can be pictures, information sources and good examples. The advice is paid for at once, the price can be calculated per hour or per session. Since the service is beneficial for the entire building, this could be reflected in who will pay for the advice, through what form of financing scheme. This also makes a strong case towards policy makers for granting a subsidy for this service.

Example 12. The institute for nZEB renovation

The institute is formally an independent non-profit organization and has member-companies. It offers cheap (co-financed) quick energy/financial scans to homeowners according to the most profitable investment, targeting homeowners to consider 90% energy reduction. The consultants bring awareness to the client about technical solutions and maintain relationships with the clients. The consultants operate with a mobile information centre and get basic financing from provinces, municipalities and banks. Commercial parties donate exhibition material. The institute gains interest from homeowners through a website, social media, partner channels and information evenings for homeowners. The institute holds close contact with professionals of all kind, delivering courses and professional training and establishing committees and working groups to address technical problems.

3.3 Discussion: Emergence of new collaboration structures

This chapter aims to investigate new opportunities resulting from national developments and on-going initiatives for collaboration for nZEB SFH renovation.

From the above overview it is clear that all countries are concerned with the issue on how to restructure the collaboration between companies in order to reach homeowners more effectively to renovate their homes towards high energy efficiency. This concern results in national, regional or local initiatives that stimulate such transition in the construction sector. However, the experiences in the various countries are very different and it is observed that countries can get new ideas from initiatives in other countries.

The start-up of activities in nZEB SFH renovation is not obvious for the companies. An important barrier on the supply side is that not many contractors are experienced or have the right knowledge to deliver such renovation or to guarantee profitable energy savings. These companies need to understand the necessity for collaboration, the customer values and the role of different actors in collaboration. Also, the companies need to develop their own good examples of demonstration projects to attract customers for nZEB SFH renovation. Collaboration with experienced professionals or consultants makes sense to attract the right knowledge and to develop first projects. Also, the awareness rising of customers and companies is key to the nZEB SFH renovation market development. The highest success for start-up can be expected when marketing is coupled with bottom-up initiatives, as costs for communication and convincing homeowners can be reduced.

Collaboration between companies requires **complementary service portfolios and compatible business cultures**. Various types of professionals can collaborate in formal or informal structures: informing actors (for example non-profit organizations or municipalities), consulting actors (for example energy consultants, banks or insurance companies), contracting actors (these can be or not be executing actors), quality assuring actors (to gain customer confidence).

One actor has to take the lead and act as the 'reassuring' contact point for the homeowner, maintaining a permanent relationship. Stronger attention is needed in order to attract customers, but at the same time advice and design is a service that somehow has to be paid for. From the country experiences it is suggested that it is imperative that collaboration structures include or refer to 'independent' actors, such as architects, certified energy auditors, institutes, non-profit organisations, and so on. From on-going developments, the importance of One Stop Shop and customer web portals, Open House Days and physical renovation stores, is expected to increase.

Before discussing detected opportunities for collaborative business model development (see Chapter 6), we first look at detected examples of collaboration structures.

4 Collaboration structures for nZEB SFH renovation

4.1 Interviews with frontrunners

The COHERENO partners investigated existing and emerging business collaboration in the nZEB SFH renovation market in their country, using both interviews with individual supply-side frontrunners and a national workshop with supply-side frontrunners. We first discuss the results from the interviews.

Each COHERENO partners selected various frontrunners regarding nZEB SFH housing in their country for interviewing. These frontrunners were consulted to understand better what opportunities and barriers enterprises detect to step into collaboration. Questions that were specifically targeted were for example: How does the enterprise collaborate with other partners and why? What are the key activities of the collaboration structure and each partner? What barriers are being encountered, for example: what are needed knowledge, competencies, resources, partners? The COHERENO partners also evaluated the enterprises' understanding of the demand side. Questions that were addressed were for example related to: What specific customer segment is addressed with what value proposition? What channels are being used to reach the customers? The guiding questionnaire can be found in the **Appendix** of the report.

In the next sections we summarize the results from the interviews according to the type of lead actor that was interviewed. We illustrate the specific collaboration structure, its view on customer segments, its marketing approach and discussed barriers and opportunities. This in itself provides various examples of possible collaboration structures according to the type of lead actor (contracting actor, consulting actor, physical store) who engages in organizing a collaboration structure for nZEB SFH renovation. We also provide some specific examples how various frontrunning policy actors contribute to form collaboration structures.

4.2 Contracting actor as lead actor

4.2.1 Contractor 1 (Belgium)

Collaboration

A **small contractor** specialized in the use of ecological alternatives to traditional thermal insulation solutions works together in a non-hierarchical setting with other like-minded **independent partners** that are enthusiastic about nZEB renovations. Due to their small size, they experience that collaboration is very useful, allowing flexibility. On top of that it decreases their administrative load, as compared to having people as paid workers.

In the renovation process the organizing contractor is responsible for the diagnosis of the project, the advice, the sales and the introduction of the building owner to the person who will do the further follow-up of the site. Clients in principle pay the organizing contractor directly; nevertheless it is possible that their partners will arrange other works for the client directly. All partners are independent, thus have their own equipment.

Coordination is ensured by regularly sitting together with all independents to get input and discuss all matters. Moreover the contractor also has an independent partner who professionally does the follow-up of the building sites. The contractor does handover for the part they are responsible for. The collaboration structure does on the other hand not offer any post-occupancy follow-up in terms of monitoring or maintenance.

Customer segments

The company does not target a specific customer segment. Nonetheless their clients tend to

be people interested in ecological materials who have done some initial research and consequently know the basics of the products, the advantages, and are willing to pay the extra price of these ecological products.

Marketing

In their communication towards (potential) customers they emphasize the **quality of their product**, and the **ecological character of the products**, and try to make clients understand comfort gains e.g. impact of insulation on the thermal comfort. However they experience comfort is not a useful argument that convinces people. Instead **trusting the salesperson** is much more important. They do not offer energy performance guarantees in their customer approach since they feel they cannot do so as providers of a partial solution i.e. wall insulation, as opposed to a holistic solution. Unburdening the customer is neither expressly used to seduce customers as their main **customers are often willing to be involved**, instead of (totally) unburdened. Lastly, although the company does not guarantee timing, they do try to be very strict in this regard, and strive to deliver even ahead of the planning.

Another aspect they are willing to develop themselves, is starting to provide some sort of instructions that go with the delivery, considering for instance a possible delivery of a user-friendly manual with instruction for operating services systems and for maintaining building and services components, as a way to establish a relationship after the works with the client. The communication channels the company uses to target customers are networks that focus on energy conscious and sustainable building (in turn the Vibe and PHP networks), campaigns via Google AdWords, their company vans, and word of mouth.

Discussion

The company considers the size of their company the main weakness, making them dependent on a small number of workers. Their plan to overcome this is growing in size. They believe growing is necessary for prosperity and this may be indeed something to consider in the face of an emerging market for nZEB renovations. Nevertheless this should go with a more concrete plan as paradoxically their size is also at the moment one of their main benefits allowing them to coordinate easily.

The future opportunities they see are a growing interest in ecological materials whereas the threats are mainly posed by the low prices of the petro-chemical market. Their reachability through specific networks seems also adequate as customers tend to recur to these when they begin to look for companies offering nZEB renovations.

4.2.2 Contractor 2 (Belgium)

Collaboration

The **contractor** is a frontrunner in ecological and sustainable construction, experienced in green buildings, passive houses and straw-bale construction. They work in new construction and renovation and are also active in the agriculture sector. They do mainly structural work, foremost insulation of facades (outer-walls) and roofs, and finishing, but they do not do the installations. The company is doing more and more timber-frame construction, thus the complete building envelope, and energy saving renovations. Although the company has no systematic collaboration arrangements with companies, they do have relations with a number of **architects** with whom they work regularly.

In the renovation process the main responsible contact person for the client during the first phases of the process tends to be the company itself. In later phases they would be as well together with an architect. Meetings between the architect, clients and whatever contractor (thus not always with all contractors) happen mostly ad-hoc.

Customer segments

The company does not aim at specific clients. However they perceive their way of working attracts a certain type: people in their 30's, 40's, with school-going children. The clients desire to insulate to a high level, or want to reach passive construction in a very ecological way.

Marketing

So far their **service** is their biggest marketing tool. In their customer approach the company emphasizes its commitment towards **environmental, economic and social sustainability**. Also more and more they advert themselves as a company providing timber frame construction. **Comfort** is also an argument as they reckon it is something their clients look for. The unburdening of the clients is also mentioned in the cases when the company does the project. They do not offer a strict energy performance assessment but they do give advice. **Timing** is guaranteed - and generally successfully kept - within some margins they propose.

The company is very ecologically minded both environmentally and socially. A characteristic feature in their construction activity is that they work locally within 20 km. Beyond that they only accept projects which are ecologically very interesting, and even then what they do is to displace themselves to the site and camp there for 3-4 long working days in order to avoid daily commuting.

Within the last 30 years they have built up a network of clients and connections that allowed them to thrive without having to advert themselves yet as consequence of the crisis, they are planning to place an advert for the first time now.

Discussion

The company experiences that ambitious environmental commitment, the comfort messages and the timing offer resonate with and are very appealing for the customers.

They sometimes find projects including social sustainability difficult to sell. For instance when they make a price offer for roof works they include the full safety package which not all other firms do, making them look pricier than their competitors. The company claims the solution is to improve efficiency of techniques or products.

The company experiences lack of on-site coordination and cooperation between various parties involved, mostly when unexperienced contractors are on board. According to the interviewee, poor on site execution can be addressed by discussing solutions beforehand. Coordination on the other hand requires an architect who is skilled at it and demands unexperienced contractors to be informed and educated as required.

4.2.3 Contractor 3 (The Netherlands)

Collaboration

Two medium-sized general **contractors** work together with an **architect**, in a structure that profiles itself as a network for building in North Holland.

The contractors observe that architects can play a coordinating role in the process. The architect communicates with the home-owner. Besides, the design of energy saving and generating measures will get importance.

The interviewees observe that municipalities could play an important role to inform home-owners independently and to get the trust of them.

Customer segments

The preference of the structure goes to public homes. The interviewed contractors are not convinced about the emerging private sector and how their firms can play a part in this sector. Disadvantages in working for private home-owners are the lack of knowledge of those clients, high expectations that not all can be fulfilled, giving up at a late step in the process and especially the competition in the market per work discipline.

Marketing

No specific marketing is done yet for owner-occupied SFH renovation. For the larger contractors the main element in the business model is the after-care: long term **maintenance and serving energy**.

Discussion

Passing through a renovation process per homeowner appears to be less interesting for the interviewees. They state this could be a market for small contractors. Homeowners have to acknowledge that the after-care is a condition for the renovation. Important is that energy measures should be combined with other measures for improving the living conditions.

As a supplement of this network a foundation will be established soon, to market a supply chain for energy renovations of public and private homes. This cluster will develop a concept for energy neutral renovation. It would apply for supply chain development support from a channel called BIK ('Bouwen aan Integrale Ketensamenwerking', developed by the province of North Holland and is organized by the Chamber of Commerce). BIK-projects consist of combinations of about five SME's in the construction sector, attached to a knowledge partner.

4.2.4 Contractor 4 (Norway)

Collaboration

A well-established **contractor** in Oslo, specialised in upgrading of all types of buildings, established a special branch which works only with renovation of SFH. The contractor employs two persons who are certified by Enova as **energy advisors**.

During the years they learnt which other complementing contractors they work well with. For specific projects they selected a limited number of subcontractors, such as a **plumbing company** and a **technical contractor**. In addition they use one **architecture company** and one **energy expert**. They have no formal agreement within this collaboration structure other than the written offers for each renovation projects.

The main contractor is economically and legally responsible towards the customer and takes a bigger risk than the partners. However, they have large trust in their partners. In all projects the main contractor appoints a dedicated project manager. All parties contribute to fixing problems occurring in difficult projects.

After handover, eventual services from any of the subcontractors are offered to the customer, including invoicing. One year after completion of a project, the main contractor always visits the customer for an oral evaluation. Beside this, some of the owners want the plumber to come once a year.

Customer segments

The company addresses its service towards a clearly defined segment which consists of houses mainly in the 60's and 70's and owners with a strong economy. It has proven to be a profitable market for the partners.

The geographically area for this business model covers the western part of Oslo and the two neighbour municipalities west of Oslo. In this area the prices are rather high. Within the SFH segment most projects are related to houses from the 60's and 70's changing owners. This happens often to be young families taking over older houses. A typical example is to buy a house for NOK 8 million and a complete retrofit with a budget of NOK 4-5 million.

Marketing

The company promotes its trustworthiness as it is **well established** and known in the area. The company claims to realize good projects which are good to live in with improved indoor comfort. It proposes to renovate within agreed time and with good economy. They emphasize to use mainly Norwegian craftsmen.

They have included a **quality assurance system** which also involves the partners. For example, water pressure is tested and a blower door test is performed. The project manager is responsible for all control forms to be filled in, but executing crafts do the documentation.

Interestingly, the collaboration is focused on using the past and existing **customers as ambassadors** for their services. Therefore it is very important to fulfil the clients' expectations.

Besides using its web site and Facebook for communicating their activities this collaboration uses a sponsor network for a local sport club and mounts a visible sign on building sites. Often they experience to get more projects in the same neighbourhood.

Discussion

The collaboration structure sees improvement potential in quality assurance procedures in planning and during of the project. They also see it as a challenge to both being an energy advisor and a contractor for the same customer.

A challenge is that clients can switch contractor after receiving service. In one case the contractor noticed that an unregistered company did a renovation after the company did the planning and filed the approval for building permit in which he was listed as responsible for a renovation project.

4.2.5 Turnkey solution supplier 1 (Austria)

Collaboration

The **turnkey supplier** specialises on renovation solutions in the area of Lower Austria. The business model has been developed within the project ARGE EEE (see chapter 3.1.1). The collaboration structure covers the whole renovation process from financial advice to executing works and it engages exclusively regional actors.

The supplier manages the entire development of a project including the financing in cooperation with a **bank** in Niederösterreich-Wien, which was a partner in the project ARGE EEE. Usually there are two **subcontractors** engaged in the renovation; a general contractor for the thermal renovation and another one for the replacement of windows. Sometimes a building service contractor for the heating system is engaged. For every different region there is a network of regional partners in order to increase confidence and trust (contractors the homeowner knows).

Because customers first check their financial situation, in many cases this is the starting point for the concept. The bank advisor draws the attention to the service, i.e. provides customers to the collaboration structure. Then, a project meeting is set up where the renovation wishes and energy advice are discussed in depth. The coordination of activities among the partners is discussed and decided at the initial meeting with all actors involved and the homeowner. If required, additional meetings of all contractors in order to coordinate works, training activities and to decide which products should be used are arranged within the collaboration structure.

Customer segments

The project manager clearly stated the targeted customer segment is single-family homes (or two parties). In most of the cases a deep renovation is requested.

Marketing

The renovation concept contains a basic scenario and several alternatives including the costs, which are guaranteed. The service offers **different modules** like energy advice only, or the energy concept including a target/actual comparison with three alternatives and regional prices. Additional modules include the renovation assistance service or the execution service as coordinator²³. According to the project manager the homeowner has a decision-making security by calculating of alternatives including the costs, which are guaranteed in a range of +10%. Additionally, the customers gets a **all-in-one solution**, the whole renovation process is handled by the provider. The fact, that the renovation service provider is the biggest utility in Lower Austria (the biggest Federal State in Austria) increases the confidence of financial security. At the moment the service is represented using different communication channels such as website, fairs or a hotline.

The collaboration structure promotes **comfort and unburdening** of the homeowner offering a trouble free coordination of the project and enhanced knowledge in energy and financial advice. The general contractor, which is usually represented by the turnkey renovation supplier, offers **guaranteed timing** by signing service contracts with partners.

Discussion

The company experiences that there exists no exact and uniform definition of nZEB renovation; the typical renovation example in Lower Austria achieves a heating energy demand less than 70 kWh/m².a. The project manager mentioned that there is only a small market potential for deep thermal renovations so far.

²³ <https://www.evn.at/EVN-AT/files/35/351edd1b-4a2a-4ece-8578-545d529c6518.pdf>

Generating a construction timetable corresponding to the personal situation of the homeowner is challenging. In some case personal contributions of the homeowner doing parts of the work have to be considered.

4.2.6 Turnkey solution supplier 2 (Belgium)

Collaboration

The contractor is a **turnkey solution supplier** who pioneered passive house construction for new houses in Belgium. Recently they have broadened their scope, incorporating turn-key renovation in their offer, for unburdening their clients and offering a complete solution. The company works for certain aspects with **subcontractors**. Energy performance calculations are one exception, outsourced to an external company, yet even then the received advice is processed internally. Next to that, air tightness testing and control of the ventilation installation is done by an external party and sometimes architecture is outsourced as well. Lastly, they work together with a **broker** in order to facilitate the financing aspect of renovations for the client.

In the renovation process almost everything is done in house by the supplier, due to the specific knowledge required. The company informs the owner, does the analysis and diagnoses the project and advises the owner (sometimes with the help of an architect). In the phase of the offer, the sales representative is the contact person for the homeowner. The homeowners pay directly to the company and can ask for a time planning. Then an appointed project leader – who is responsible for various projects in a region – arranges all construction activities according to a very well prepared file which stipulates precisely what works have to be executed at what time, and often also by whom. All project managers are headed by a general project manager, who specifically keeps an eye on complex or non-standard projects. The company currently does not perform any tasks regarding the post-occupancy follow up e.g. monitoring, maintenance, etc. but it does deliver a user guide to the homeowners with clear maintenance guidelines and instructions that allows them to understand how to maintain their house

Customer segments

The company focuses its activities towards a customer segment with the ambition to make their house ready for a coming generation and with purchasing power to pay for such work (with a budget 150k - 200k+). In fact, clients look for the company for their experience with passive construction, even when they do not necessarily want to build passive.

Marketing

The main promoted customer value is the **turnkey** renovation. Also the **attractive price/quality** relation is highlighted when making an offer, with the basic **knowledge of passive construction** included in the price. Although the company does provide energy performance guarantees for new construction, for renovation they do not. They however provide **guaranteed timing** and a **risk management** procedure, with a study that defines the project in detail in order to reduce the risks in the future execution. Based on this study a detailed offer is made. Clients have to pay for the study but the sales person has the freedom to determine the price of this study agreement. If a number of clients do not sign a contract after the study has been done, costs will have to be recuperated elsewhere.

'Comfort' is not actively promoted as a customer value for the company believes that talking to a client about improving their comfort can create a mismatch when the client cannot afford it. And for clients who can afford it, comfort is often interpreted as active components and technical installations.

Although in the first place clients do not generally show any energy efficiency ambitions, the company proposes these possibilities and makes a specific offer tailored on the client's budget. The communication channels the company uses to target its potential customers are the internet, magazines, radio, news-papers and so on.

Discussion

The company is challenged by the need to keep looking at their strong points that make a

difference with other companies, and to not forget them under the pressure of prices. The guaranteed timing the company offers is a clear competitive advantage as many other companies do not offer that despite this being something most end user claim to value. Another big challenge in renovation is to be able to communicate that the proposed works are an added value instead of an added cost. Threats are observed from the government, who does not give clear signals about what the future brings, the company is afraid the clients will not be eager to go far.

4.2.7 Group of companies (Norway)

Collaboration

This collaboration is between an **architect**, a **general contractor**, a **plumber**, an **electrical installer** and a **ventilation expert**. The group just started its first renovation to performance levels similar to the new building code. The companies have earlier cooperated on both new construction and retrofitting projects, but without having defined a common business model or a holistic project approach. The companies joined forces by an innovation program initiated by Innovation Norway with the goal to develop a concept for targeting the market for retrofitting of SFH. All partners thus participated in training programs with national experts in energy efficient buildings. The general contractor has also followed an official energy advisor course, was certified for this and as a consequence it was listed as recommended auditor. The project manager is either the general contractor or - in projects which include enlargement or changing of facades - the architect. The customer may choose if he wants separate invoices from each actor or a common invoice from the project manager. In the latter case, the project manager will add a small premium for the additional management.

Customer segments

The collaboration structure initially defined its own municipality and two neighbour municipalities as their operational area. They focus on SFH from 1960 – 1980 and on change of ownership, typically by generation change/ inheritance settlements but also through the open market.

The reality is that the group consists of well-established contractors that are well known in the local market, each of them receiving requests from all types of clients. As a result, each of the partners now considers if a request should be answered by the group or not.

Marketing

The structure's main value proposition is **trust**, as the collaboration consists of companies with a good reputation, and which have been in the business for a long time. They offer a "full package": from audit to completion of renovation. A specific value proposition they address is called "Trygghet" which means both confidence and security²⁴. They also address **comfort** - both as indoor climate and as a "comfortable" process – and **energy efficiency** through reduction of energy use and control of the need for energy. They offer **assistance** in grant applications

In order to build a good customer relationship the collaboration intends to make each project a good reference, close to what was budgeted. They intend to evaluate each project and provide good documentation for the use phase and also offer a service contract.

They work on good communication, which was picked up by a local newspaper. Beside this, the renovation service is announced on the partners' web sites. They do not advertise as this may be interpreted as they have too little to do. The general contractor is also officially listed as the only recommended actor in this region.

Discussion

The main contractor – who also offers energy audits - faces a dilemma: give a neutral advice

²⁴ The first part of the double meaning is about trust from a group including all subjects, while the second meaning points towards security by doing things right (including security regarding electrical installation).

and at same time offer a complete package. The neutrality is partly improved by being certified by Enova and by using their audit tool. They feel it would help if other neutral sources would also explain in an easy understandable way the need to increase the ambition level, including for example arguments for balanced ventilation²⁵.

The partners in this collaboration are all depending on cooperation with other local companies besides their partners. For example, the electrical installation company wants to be included on projects run by other general contractors. The partners are afraid that other local actors might treat this collaboration as a competitor, and therefore partners might not be asked for contribution on other projects. As a consequence they have not given this collaboration a public name, but market the service as such through their existing channels.

4.2.8 Installers (The Netherlands)

Collaboration

A network was initiated by innovation office of the Ministry of Economic Affairs Syntens, the Dutch trade organization of service companies in construction Uneto VNI and knowledge institute TNO (Oostra, 2011). It currently assembles a dozen regional collaboration structures where installers take a leading role. These individual collaboration structures consist of a **contractor**, an **building service installer** and an **energy adviser**. In some cases also an architect, a specialized consultant or a contractor for windows and glazing are involved.

Customer segments

The collaborations address both the residential and the non-residential sector.

Marketing

The individual collaboration structures emphasize their position to **deliver one bill** for the whole renovation, as well as **good advice** from a qualified energy consultant.

The overarching network finances itself via membership fees and keeps track of new developments and allows to develop solutions for financing, marketing, communication and quality.

Discussion

The initiative started with about 40 regional collaborations. Due to the market development and the construction crisis in the Netherlands many takeovers and various bankruptcies took place in the installation sector. Due to the quality system low quality collaborations also dropped out. Today only a few collaboration structures remain active. The network had the impression that they had to put a lot of effort in stimulating demand and that this development could be coordinated better with other initiatives such as Meer Met Minder (See 4.5.2).

4.3 Consulting actor as lead actor

4.3.1 Architecture company 1 (Belgium)

Collaboration

The company consists of a young **team of architects** balanced with the experience of two older partners. Despite the fact that to date they did not systematically collaborate with specific companies, they do work with **subcontractors** e.g. timber frame construction companies, brick wall contractors, installers, and finishers, in their renovation projects. At the moment they are initiating a collaboration structure with a wood structure producer who asked them to form a team with expertise on energy efficient constructions in order to create a platform that would offer answers to the questions they get.

²⁵ The danger is that the owner asks for a solution with lower ambitions than the suppliers want to offer. Their attitude is that the offered package has to take into account the preferences of the homeowner. They have experienced a general scepticism towards installing a ventilation system.

Informing the owner, diagnosis of the project and advice, execution of works, and handover is done by architects. Their service does not include post-occupancy, follow up in terms of monitoring, maintenance, and so on. When performing a renovation the contact point for the homeowner is the architecture company. Coordination of activities among partners in (heavily split up) renovation (works) happens by taking the time to sit together with all different contractors and discussing matters for a few hours, a few times a week. In addition, before the works begin they always have a first meeting with all technical contractors to prepare the works. Also in the cases when the architect looks for the contractor - instead of the client – the company tries to arrange a meeting with the contractor in which they explain the plan.

Customer segments

In general the team of architects targets very different customer segments (large clients as well as households) to whom differing value propositions are offered without really giving a thought to that. Their preference is towards small renovations with energy efficiency targets, the main segment being small extensions i.e. addressing young couples. The company mainly attracts clients with an architectural ambition.

Marketing

Despite having ample knowledge and experience in both traditional masonry construction as well as in timber frame construction, they do not explicitly communicate this in their customer approach. They believe their strength comes from **making a specific language for every project. Comfort and quality** on the other hand are always communicated. Possible **unburdening** of the owner as well, which allows the firm to have complete control (**there is a price attached to this**). The company does not provide a guarantee for delivery times although they say to strive to stick to the planning. In addition to that in their communication with their clients they clearly explain timing depends largely on the contractors.

They reach out to customers by word of mouth, local visibility of their projects through open house days and the like, participating in debates, their website, their office, partaking in competitions and showing that they really want to think together with the clients are their means to attract small renovation projects. They deliberately do not use third party labels. Additionally, the education realm poses interest for them: “Since the architects’ world is a small world, being part of the corpse of teachers will make you a reference”.

Discussion

It is the architecture firm who tries to introduce the energy efficiency aspect into play. They do so for every project, yet they often “hit a wall of budgets” and also prejudices regarding new ways of construction.

The company believes their main weakness is their limited number of reference projects. Another problem is that once the works start, the owner tends to push the architect to the background, and have direct contact with the contractors who are on-site, even though these contractors tend to lack the big picture of the works. Next to that it seems that people connect the name of the architecture company to larger projects, while they even have a preference for small ones. Additionally, an external threat they perceive are actors in the sector who work below the market price.

4.3.2 Architecture company 2 (Belgium)

Collaboration

The company is the sum of two former architecture firms, both experienced in ecological and energy efficient construction and renovation. The company brings together relevant parties such as the **engineer, architect** and **energy advisor** and offers an integrated architectural solution from design to stability and energy use, with focus on a budget-friendly approach. They use a large **network of subcontractors**.

In each case, the architect is the main responsible for the communication between the client and the contractors, and the general coordination of parties. In some cases responsibility is taken over by another actor at the execution phase. According to the client’s wishes and the

complexity of projects, they engage in various types of informal collaboration structures. For each project they choose whom to work with prioritizing contractors located close to the site. They approach more complex projects with a **building team** format. In such case the partners that will work on the renovation are established as soon as possible. They hold a meeting at the start to ensure everyone knows each other and pursues the same goals.

At the request of the client, a timing guarantee is sometimes offered under the formula of “**architects-builders**”. In such case, a **general contractor** includes the requested timing guarantee in a general contract with the client.

The company is trying to set up a **collaboration with a high school** to provide clients with **monitoring of actual energy** so that the settings upon which the installations depend can be evaluated and if necessary adjusted.

Customer segments

The company’s customers are people that care about sustainable building and bio-ecological building. Clients range from SFH owners to investors that want to work (together) in a different way and are looking for something more than mere return on investment.

With regards to private individuals the company notices two different groups: a few younger households from 25-35, with slightly limited (financial) means who consequently want to make the renovation works as affordable as possible. The other segment is composed of households aged 50-55+, generally with more means, who live already in their second house which they want to make their definitive one.

Marketing

What the company offers the client is a **selection of contractors** they have experience with and therefore know how to deal with. Still, clients can propose contractors of their choice if they would like to. **Sustainability, unburdening of the client** and **health-aspects** – which the company relates to comfort - are included in their communication messages.

The company provides its clients with **energy performance guarantees** to a certain extent by ensuring a blower-door test is always done posterior to the renovation, combined with an infrared inspection to scan for thermal bridges.

The customers find the company still mostly through word of mouth and more and more via their company website. On top of that the company is regularly visible at fairs, networking events, via an architect federation and so on.

Discussion

The company finds it challenging to deal with younger clients with limited financial means. Incorporating more stringent wishes regarding ecological renovation can make their service too expensive. In addition the company perceives competition is growing, as there are more and more firms offering services with an energy focus.

The company believes its communication can be improved, providing clients with independent information. They experience that client sometimes have a total lack of knowledge. This raises doubts about the client’s ability to maintain certain installations, for example a mechanical ventilation system.

Poor on-site execution is experienced to be a common problem due to lack of knowledge of the professionals executing the works, especially younger architects and contractors. Information flow among the professionals appears to be suboptimal. A possible solution the company sees is ensuring every actor gets an adequate training. The company thinks it is essential to take the time to discuss the construction details together with the contractor(s) before execution. In addition to this, the company “dreams” of developing manuals or guidelines explaining how to operate and maintain systems.

4.3.3 Architecture company 3 (The Netherlands)

Collaboration

The municipality of Wageningen (in the center of the Netherlands) ‘forced’ local firms to form collaborations and challenged them to make energy zero renovation proposals for terraced SFH in three neighbourhoods of the city. A local design office co-established a consortium of

local firms in Wageningen to propose an energy zero redesign for typical SFH built in 1972. The consortium is formed by an **architectural office** (lead actor), a **construction firm**, an **energy consultant** and a **consultancy firm for building services**. The architectural office also took the initiative to involve other **non-local partners** for their knowledge and innovation, for example for the development of specific window frames. Also, five **households** contributed to the consortium as a reflection group.

Central to the collaboration is the renovation of a pilot house which will start during the summer of 2014. Generally the knowledge development within the consortium is traditional: the design proposal of the architect is budgeted by the contractor and the energy consultant calculates the energy savings and needed insulation values. The consortium is liable for the quality. The architect will assess together with the constructor the realization like the insulation products and the energy advisor will perform a blower door test. The energy generation will be guaranteed.

Customer segments

The collaboration targets households that have a general interest in the energy neutral concept. These can be diverse: young or old, with or without children. The customers generally value climate issues and a good financial offer.

Marketing

The marketing emphasizes the **energy concept** approach. The good thermal insulation of the construction is highlighted. The owners are offered the choice between three options for facade finishing, agreed by the municipality office responsible for the appearance. Besides, solar panels and a new ventilation system are being installed. Almost the whole **renovation will be done from the exterior** side, to minimize the inconvenience for the owner. Next to energy savings a **better comfort** and an **increasing market value** are important. A real estate agent estimated that applying the measures of the concept would increase the value of the house by 35.000 €. Also, **reducing of maintenance costs** is proposed as a customer value. For example, the avoided maintenance costs for SFH are estimated to be around 26.000 €. This does not lower the initial needed investment from the homeowner, but makes the choice more interesting.

The company markets **financial benefits when repeating** the concept in a row. For example, the needed investment for a single renovation is estimated to be 75.000 € including VAT. With a serial approach in a very efficient construction proves this could be lowered (the company mentioned a “very rough estimate” of about -15.000 €). Because the whole renovation will not be affordable for all households, the concept can also be realized **step-by-step**.

The communication approach consists of a door-to-door communication campaign to invite inhabitants to come to an information evening. The company thinks they need to get in conversation with homeowners to get to know them.

Discussion

The architectural office having a central role has experienced that all consortium members should share enthusiasm and knowledge of their own discipline to speed up the process, for completeness and to accentuate the concept. Important is to inform clients with a uniform and well thought-out plan.

4.3.4 Architecture company 4 (Norway)

Collaboration

An **architect** operates in southern Norway to upgrade SFH towards passive house standard. He has held several speeches about the topic in other parts of Norway, and now also being hired by Enova to give courses in planning of passive houses. The owner is also the founder of a **contractor** company which does most of the construction work. Other works as electrical installation and plumbing are executed by other contractors. Depending on the type of the projects, they hire other specialists for ventilation, heating systems and energy expertise.

The architect does the planning and most of the project management of both new construction and renovation projects. The architect gives courses to home-owners, identifies the needs, and finally elaborates a practical approach which also includes involving the respective contractors. The main contractor – supported by the architect - coordinates the activities of the other actors during execution and hand-over.

Each of the involved contractors invoices the homeowner separately. They try to avoid fixed pricing, but they make a budget proposal which so far has proved to be viable in most projects. Therefore only few asked for a fixed price contract (in such cases they added a risk premium).

The collaboration structure use blower door testing and thermography as quality assurance of the project. They also focus on the continuous development of the craftsmen's knowledge by organising regularly training evenings to be updated about new things.

Customer segments

The collaboration group has not defined a specific target group to which the service is marketed. Their experience is that there are big differences in characteristics of the owners who ask for their services, but most are "mature". The buildings vary mainly within the period from the 60'ies until end 80'ies.

Marketing

Regarding the offered value proposition the company focuses on its practical approach. The ambition is to be **better than existing** building code and thus to **increase the value of the house** by cutting the gap compared to new houses. The company adapt **sustainability** arguments to the clients' preferences and focuses on **comfort/indoor climate**. They **assist with application** for grants and low interest loans

As the architect has succeeded to become quite well profiled as an expert in very energy efficient buildings, the company relies on its good reputation and potential clients contact him. They build a position as a competent frontrunner. The main channels for marketing their services are through courses about energy efficient houses and via newspapers writing about their ambitious projects. As they get the image of being a frontrunner, municipalities recommend the service of the collaboration structure. The companies involved also promote their reference projects on their web sites.

Discussion

The company observed that SFH owners tend to do their own research on available solutions and actors. Such persons will easily find a frontrunner and recognise it as serious through their references and recommendations.

The company experiences that energy advisors lack knowledge about practical implications of different measures. Therefore they have involved contractors in the design phase of the projects. Lack of coordination and on-going quality assurance on the building site has also been a challenge. The architect and advisor must be on site to improve this.

Possible service improvement are organizing on-going quality assurance during execution, offering time and price guarantees and developing a follow-up service.

4.3.5 Architecture company 5 (Germany)

Collaboration

The architectural company has two offices in the middle of Germany and realises projects in the middle and in southern parts of Germany and several projects abroad. For many years they plan, build and renovate various buildings for very different people according to their needs.

The **architects** build all new buildings to passive house standards and optimize energy buildings with passive house components ecologically and economically thoughtful. The inclusion of renewable forms of energy from solar thermal, photovoltaic, geothermal and wood is natural for this company. According the complexity of projects, they engage in various types of collaboration structures always on focus to build passive houses. They work within several **networks** of passive house planners and architects and are very energetic in

climate protection and environmental networks and agencies.

The company works regularly with **subcontractors** whom they involve in the works mostly after the planning documentation phase. This collaboration with contractors does happen systematically.

Customer segments

The architectural company has not defined a specific target group to which the service is provided. There are big differences in characteristics of the clients who ask for their services. The projects start with private homes up to large residential, trades and office buildings. New buildings as well as modernisations and conversions belong to the portfolio of the company.

Marketing

Regarding the offered value proposition the company focuses mainly on the efficiency level with **passive house standard**.

They adapt sustainability arguments to the clients' preferences and focus on **comfort/indoor climate** and **increase of the value** of the refurbished building. They promote their practical approach and use their good reputation. They assist with application for grants and low interest loans

The companies involved also promote their reference projects on their websites. The architects have become well profiled as experts in very energy-efficient buildings. The main channels for marketing their services are through **courses about energy-efficient houses** and via architectural magazines writing articles about their ambitious projects and they won several awards.

Discussion

The mayor challenge for the company is to convince clients to invest a bit more into feel-good houses with extremely low heating costs and comfort instead of standard solutions. The company experiences show that many potential clients have a lack of knowledge about passive houses. They do a lot of educational work and give trainings and lectures about these issues.

4.3.6 Architecture company 6 (Germany)

Collaboration

Architects and **engineers** collaborate in two offices in Berlin. They realised a multiplicity of projects in all parts of Germany and in several other countries. The company focuses on refurbishments to high efficient standards, climate-friendly solar architecture, passive solar building systems as well as energy consulting and expert opinion.

The early integration of other planning disciplines, city planning, landscape planning, architecture, clay building, technical building systems, structural design leads to innovative building concepts - based on user needs - ensure the quality in design and execution as well as optimize the use of the building taking into account ecological relationships operationally and economically.

The company works regularly with **planning companies** and tradespeople whom they involve in the works with the beginning of the projects. This collaboration does happen systematically mainly with **HVAC consultants**.

Customer segments

The architectural company has not defined a specific target group to which the service is provided. There are big differences in characteristics of the clients who ask for their services. They engage in detached houses and multi-level residential projects with a focus on ecological planning principles but also in non-residential buildings (commercial, industrial, research and teaching facilities).

Marketing

The architects rely on their **profile as experts** in new construction and modernisation projects with ecological relevance.

The companies involved promote their reference projects on their websites. The main channels for marketing their services are through brochures and organising excursions for

building professionals and lay people. Furthermore the architects are members in diverse networks.

Discussion

One of the main tasks for the company is to promote their own business model - the early integration of other planning disciplines in combination with ecological and energy efficiency aspects – as advantages towards other competitors. They want to convince clients to invest a more in low heating costs and comfort instead of standard solutions.

4.3.7 Planning company (Germany)

Collaboration

The company consists of a team of **architects**, **engineers** and master **craftsmen**. It combines the fields of architecture, technical building equipment, building physics and funding advice with a focus on wood construction. Through this integrated approach, the company tries to minimize interface losses and the clients get the entire planning lines from a single source.

The company works systematically together with specific **companies** and **experts**. Depending on specific projects they integrate other specialists in the planning using small network structures.

Customer segments

In general the company targets very different customer segments, starting from single-family house owners up to large clients. Their preference is towards larger domestic buildings renovations with energy efficiency targets.

Marketing

The core customer value in the business model of the company is the **entire planning from a single source**. Some members of the company are certified as “Passivhausplaner” and listed as “Efficiency house expert” by dena.

Discussion

The multidisciplinary office has experienced that all company and network members should share widespread knowledge and openness to learn every time and from each other. This concept will bring them advantages towards other competitors.

4.3.8 Network of planners (Austria)

Collaboration

The energy design network is an independent network of planners using a standardized tool for potential analysis. The service includes 19 **design and planning offices** employing more than 100 people.

Customer segments

The platform is a kind of a networking tool aiming to bring together (undefined) potential customers, designers and building experts.

Marketing

The main benefit for homeowners is a **professional energy advice** (potential analysis), which is carried out in two steps.

In a first meeting renovation measures and the potential energy savings are discussed with the homeowner. The meeting is also used to outline the financial framework of the renovation and for orientation. The second phase contains a comprehensive analysis of the building and **calculation of different variants**. The whole process is carried out with **special software**, developed for renovations. The concept and results of the calculations are checked by a third party or expert in order to be transparent and independent. The final results are presented to the homeowner and serve as a basis for the further planning process.

The software tool is also a **communication platform** allowing interactive communication between homeowners and building experts. The networking platform especially offers an advantage to small and medium sized companies or planners, problems can also be solved

in a collaborative way. Therefore, the software attracts all kind of renovation, not specifically focusing on single-family houses or nZEB renovations.

Discussion

In general, the networking platform is quite new, starting in autumn 2013. However, the concept behind this idea sounds promising but no major experiences have been made until the interview.

4.3.9 Project manager (Norway)

Collaboration

The company, located in the south east of Oslo, was the first to launch a holistic energy audit for SFH. It also won a contract to give certification courses for energy advisors nationwide. The company wanted to offer a service to complement the energy audit - which they sold for a fixed price without earning money on this – with a service as **project manager** by working together with a limited number of prequalified companies within each craft. For specific projects they asked for competing offers from preselected **contractors**.

The project manager first does an energy audit of the house. Based on this they present the SFH owner the optional renovation strategies. According to the owner's preferences and financial frame a detailed plan is made which is distributed to prequalified suppliers (minimum two for each craft) as a tender. When the suppliers have been chosen, the project manager coordinates the execution of the work. Unexpected issues during the renovation are solved by direct communication between the project manager and the relevant contractor and eventually the home-owner.

Customer segments

The company has defined their customer segment very wide: all SFH owners. In practice, they are involved in projects where the required standard is better than the existing building code for new houses.

Marketing

The company use a guide for how to get a grant from Enova for the energy audit to convince SFH owners to execute an energy audit for a cost of NOK 10.000 of which NOK 5.000 is funded by a grant from Enova. The customers are offered various **fixed price services**, following the **energy audit**. The company assists in **describing the project** ready to be distributed **as tender**. Other services include assisting in comparing received offers and in negotiating and signing of contract. Further, **project management** is offered at varying price depending on each project. The company uses references in different (independent) channels and emphasizes its value of good counselling - the customer gets more for the investment.

Besides their own web promotion, the company has developed a wide network of partners promoting their service. On the Oslo municipal web pages where energy-saving grants are presented, energy audits executed by the project manager are promoted. As the company's project managers are certified by Enova, they are also listed on Enova's website. Also three national hardware stores promote the service, and so does one national chain of contractors offering predesigned houses. For these chains they also give courses for both employees and customers.

Discussion

The initial idea was that all involved contractors would invoice the project manager, who would invoice the total sum including the management to the house owner. Due to different legal warranty periods between businesses, the company would have to take the risk for executing work, a risk that they could not forward to the responsible subcontractor. As a consequence, the house owner is now invoiced directly but via the project manager who certifies each bill.

The pricing model for the project management in a first project was a fixed percentage of the total cost of the renovation project. As this meant that the project manager earned more the more expensive the total project became, it was concluded that this was not a trustworthy

price model. This has therefore been changed to a fixed project price or a price per hour spent, depending on the project.

The mayor challenge the company faced was to make the SFH owners - who are ready to pay for execution of work but less for planning and project management - understand the need and the cost of project management. Owners buying this service could be defined as innovators. The company also faced that there is little tradition with written contracts for renovation projects for SFH. There is neither a requirement in the building regulations that air tightness has to be tested at the end of a renovation.

The company experiences balancing independence and offering a total integrated service. They now have split their counselling and project management services into separate parts or "products" in order to lower the threshold for buying services. However, this was observed not to solve the problem of fragmentation in renovation processes. Therefore a stronger integration with selected contractors might be considered in the future, or being a subcontractor of the main contractor.

The company has received a very strong interest for its training courses for professionals. As a consequence these courses are today the biggest part of its business. However, as a synergy the company still does project management which makes the training credible.

4.3.10 Energy advisor (Norway)

Collaboration

An **energy advisor** in Trondheim has been a key person in two of the most energy efficient renovation projects in Norway. His intentions are to use these experiences to multiply the number of high ambition renovation projects. He has no formal cooperation with **executing companies**, but cooperates on a project basis. He also cooperates with a big **engineering company** and an **architect**.

This case is not a complete holistic service as such, but as he has been hired by house owners to do the energy audit and counselling through the projects, he has played a very important role in realising very ambitious renovation projects.

Customer segments

The energy advisor has not defined one particular target market as he covers all home owners.

Marketing

The value propositions the adviser offers to his clients are:

- On time **counselling** based on knowledge about holistic renovation documented by references
- Strong focus on **comfort** and **indoor climate**
- **Sustainable solutions** such as renewable energy, heat pumps, bioenergy.
- **Assistance** with applications to State Housing Bank and other funding.

The energy advisor is certified by Enova and listed as recommended on their web site. The service is of course also promoted on the company's own web site. Further his service is recommended by two of the municipalities in the region.

Discussion

The company observes that the coordination between the different actors has been a challenge. The energy advisor has experienced that he has been involved too late in the projects, resulting in some lost opportunities.

As a part of this the on-going quality assurance is considered not good enough. No intentions are specified to offer a complete package including the construction work. It is observed that in Norway, many SFH owners initiate their projects by contacting a contractor. Cooperation with such actors is considered to be a very relevant additional channel. Beside the idea of promoting the service also towards the supplier side, the adviser could also organize home-owner evenings.

4.4 Renovation store as lead actor

4.4.1 Hardware store (Norway)

Collaboration

A **hardware store** (10 employees) in a small region in Western Norway collaborates with a small **general contractor/energy advisor** (3 employees), an **electrical installation company** (42 employees) and a **plumber** (2 persons employed). The enthusiastic general store manager - educated as building engineer - plays the key role together with the general contractor who has been certified as energy advisor by Enova. The partners in this collaboration joined the previously described innovation program by Innovation Norway in September 2013. They are now in the planning phase of two projects.

The person who is first contacted will reflect on project management. If, for example, the plumber is first contacted and sees that this is mainly a plumbing job with some minor assistance from other crafts, he will be the project manager himself and will require assistance from the other as needed. For bigger projects, it will be the main contractor taking on the role as project manager. The manager in the hardware store will be involved in the planning of such projects. If needed, they will also include an **architect** for changes of the façades.

Customer segments

The collaboration structure has defined its target segment as persons above forty, with good income perspectives, planning to stay in their house also after retirement.

Marketing

Related to the customer segment, the collaboration addresses specific needs. They stress importance of **improved comfort** and a home which is **safe (also for older people)** and needs **little maintenance**. Possible **increases in space** are proposed for kitchens and bathrooms (universal design).

This collaboration offers value propositions such as increased value of building and lowered operational costs, increased security and comfort, and one single contact point with understanding of customer needs. They expressed how they will build good customer relationship: through good personal counselling, implementation capability within right time and price.

The customers are addressed through the store itself, information evenings, press releases, web, direct mail, and recommendation listed by Enova. The partners are not afraid of being seen by other contractors as one group. Therefore they also have named the group: "Team bedre bolig" (Team for a better home).

Discussion

The cooperation sees the advantage of the hardware store as channel for communicating holistic renovation. The reason why they have not done that so far is because there is limited space. They are planning an extension of the store, so there will be better possibilities for making a "renovation shop" within the store.

The main challenge for this collaboration structure is limited capacity among the partners to devote sufficient resources. As small companies, they all have to balance the follow-up of existing customers within the new construction market and this new cooperation. The collaboration has to find ways of how they can increase their capacity either by hiring more persons or by cooperating with competitors.

Further, the companies are not yet familiar with cooperating. They therefore need some time to develop trust and experience from working together. They are sometimes in doubt whether it is the hardware store or the contractor who should take the lead in the cooperation. This differs from case to case.

4.4.2 Renovation store 1 (The Netherlands)

Collaboration

The lead actor is an independent professional and presents herself as a '**renovation store**' in the east part of the Netherlands (Nijmegen area).

The company collaborates with various supply-side professionals. For large works, the company works together with a **general contractor**. For smaller works, smaller contractors are sometimes consulted, such as an **installation company**, a company that does **roofing** works, an **energy performance (EPA-W) consultant** and an **independent professional** for occasional works. The renovation store developed a process document that specifies the role of each actor in various construction phases. The client orientation and advice are mainly covered by the renovation store.

The renovation store highly values the contact with **company networks** such as a branch organisation of companies specialized in 'zero-on-the-meter' solutions. Also, the locally based network 'The New Approach towards Construction' (DNA in de bouw) allows the company to get in touch with other professionals or potential clients.

There are no specific agreements (yet) for distribution of income between various collaborating actors. Only the collaboration with the general contractor is formalized by means of an offer document (template) that specifies general conditions for construction and installation works for renovation.

The general contractor is a member of BouwGarant. BouwGarant is the largest certification system for construction works in the Netherlands (1500 companies participating). All these companies are regularly checked according to requirements regarding craftsmanship, quality and reliability²⁶. Monitoring is done by the renovation store and in this phase also possible changes by the installation company are integrated.

Customer segments

The collaboration aims to target SFH owners with a medium to slightly higher income. The medium income segment lives in houses from the thirties in the central Nijmegen area. These houses are highly wanted by young families, but the houses differ a lot, have been altered during the years and express a high degree of do-it-yourself. The higher income segment is targeted in the houses from the seventies in the area of Nijmegen beyond the urban perimeter. These houses are more luxurious, but their value decreased substantially in the last years.

Marketing

As a unique selling point the company offers 'comfortable living with zero on the meter'. The company mainly markets the **energy performance level** that will be reached after renovation. Next to the energy performance level, the client also has the option to require environmentally beneficial solutions such as FSC or PEFC.

The company asks an independent energy performance advisor or an architect to guarantee the energy performance level with an energy performance certificate after renovation. This certificate should have the **label A++** (or any other level agreed with the customer). The company emphasizes **energy monitoring** as part of the **delivered service**. The client should install a smart meter and allow the renovation store to read the energy data.

The company markets **higher value** after renovation, for example for sales. For example, customers who paid about 400.000 to 500.000 EUR for the acquisition of the house might want to invest in an extra cost for 'zero on the meter' of about 25.000 to 35.000 EUR, next to other renovation measures being in the order of 30.000 to 70.000 EUR. The marketing message in talks is usually focused on comfort.

An important client channel is the company website. The renovation store is exploring the effectiveness of various other communication channels to reach customers. A first announcement on the Dutch real estate portal funda.nl delivered no reactions during one month. Also, real estate managers showed no interest. Mortgage consultants showed more interest and the renovation store thinks they might play a role when financing is an issue of

²⁶ See: www.verbouwgarantie.nl

concern. The company experienced that a newsletter towards an own network of 500 people is very effective. The company spreads folders door-to-door and the name of the store is also being highlighted by the “cheap” Google AdWords. The company is present on local energy/environmental fairs that target households and it also organizes workshops for households. The company considers advertising in a local newspaper and later it will also contact municipalities and energy companies and try to use banners on a demo house.

Discussion

The renovation store experienced that in reality ‘zero on the meter’ is not feasible as a proposition. It therefore now uses a working definition of renovation towards a label A++ or a maximum energy index of 0,5.

Although the renovation store has a very detailed plan and customer segment, until now no clients were found. A first contract was offered to an elderly (70+) couple to realize a whole renovation within two weeks while the couple would be on holiday. At the last moment they did not sign the offer. While one homeowner was convinced that the offer was good, the other still was not assured. According to the renovation store, this might be due to ignorance, fear or because results were presented with a payback time of 15 years.

Considering the need for knowledge, the renovation store considers that still some more background knowledge is needed, for example about (understanding payback times of) installations.

4.4.3 Renovation store 2 (The Netherlands)

Collaboration

The **renovation store** is situated in the west part of the Netherlands (Vlaardingen) and opened its ‘physical’ doors in June 2014. It was one of the winning concepts for renovation stores in a competition of the Stroomversnelling (See Example 6). The client channel in the store is a salesman and adviser, and during the assessment, design and realization phases a project leader.

The company is a shop-in-shop concept. The shop itself sells sun blinds and is located on a furniture strip. The renovation store works independent from the other shop. The shops sell products from specific **suppliers**. That means they are not fully independent. This is also the reason that their advice is for free. To install the products the renovation store works together with **local installers**. Those firms are in the first place approved enterprises for installing specific products. They also selected **consulting firms** that can give an (energy) assessment of dwellings and can give advice about design and energy solutions.

Experienced consumers are asked to act as ambassadors and to contribute to workshops that are organized for other uninformed consumers.

Customer segments

Various customers are entering the shop with ideas in head about changing the (interior of their) house. The renovation store inside wants to offer overall solutions for energy renovations of single-family dwellings. The renovation store attracts aware and also unaware homeowners. They aren’t targeting any specific customer segment.

They state that a “perfect client” would have sufficient financial means and would like clarity to save energy, improve comfort, and to avoid any trouble about execution and quality.

Marketing

The concept is based upon **energy savings, comfort** and unburdening the home-owner by taking **care of** all the arrangements. The company is aware that most of the clients will not look for total renovation concepts for their home, but maybe just single energy saving measures.

The client channels are in the first place the website and the physical shop.

The shop offers **product and process guarantees**, and will guarantee the electricity generation. Also the renovation store is **liable** for the work of all professional actors involved.

Discussion

While the renovation store is liable, the collaborative structure between all actors involved is

quite loose. The renovation store is aware that the selection of contractors is crucial. The renovation store is still starting up and is not really aware of customer segments and market potential. In general, knowledge about customer segments, value propositions, channels and relationships in respect of energy efficiency in the SHF market is still limited. The location of the renovation store on a furniture strip looks promising. However, the location of this furniture strip is not specifically near neighbourhoods with a high market potential. It could be discussed if a shop that sells specific products will be trusted by the client that values independent advice.

4.5 Supporting initiatives involving public actors

4.5.1 Expert listing in databases (Germany)

Collaboration

Germany has a strong policy supported framework for quality assured contractors and consultants, for example the **dena** “Efficiency-House Expert List”. About 8.000 highly qualified professionals are listed in this database. These **experts** (architect, craftsman, engineer or similar) have completed a training in energy-efficient construction and renovation in addition to construction-related training.

The special feature of this database is that many experts present their references and give website visitors (potential building owners or building expert looking for collaboration partners) the opportunity to convince themselves to specific example projects on the quality of their work. This is possible because of a link to the dena “Efficiency House Database” where more than 1.000 energy-efficient buildings are presented.

Customer segments

In the dena “Efficiency-House Expert List” website visitors can select the relevant project partner for a collaboration in the construction process and homeowners find experts in their region. In the dena “Energy Efficiency House” database users see Germany's numerous efficiency houses that will show what can be achieved with energy refurbishment.

Marketing

The main value proposition is that many experts present their references, thus giving the opportunity to persuade specific example projects on the quality of their work. Home-owners can search experts by filtering areas and offered construction relevant services.

Discussion

Both databases are in progress all the time. New experts can register as well as new buildings can be filled in.

4.5.2 Building sector initiative (The Netherlands)

Collaboration

Individual **contractors** are supported by the More with Less (Meer met Minder, MMM) organisation. More with Less is a **building sector** initiative to engage contractors in the energy saving measures. Initiators are the Dutch federations Bouwend NL (contractors), Vereniging Energie Nederland (energy companies) and UNETO-VNI (installers). **Municipalities** and **non-profit organisations** refer systematically to the MMM contractors who are registered and insured. Homeowners with ideas about their renovation contact an MMM-supplier directly via the website. Afterwards they can decide if they want further advice or an offer from a certified supplier. MMM thus aims to stimulate demand, that is executed by contractors. MMM engages in a certification scheme and support for supply chain integration. The contractor has to be registered at the Chamber of Commerce and has to have the necessary company insurances. They have to agree to minimal quality requirements, such as having a visible procedure for handling complaints and attending an MMM introduction meeting. Also, follow-up courses are offered on a voluntary basis. The advice procedure for

customers and the definition of energy labels is standardized. Contractors are requested to communicate the MMM logo and their participation to MMM. As of 1 January 2012 the contractors pay a yearly fee of 200 € excl. VAT to the MMM organization.

Customer segments

There are no specific customer segments defined for the contractors. The coverage of the programme is national.

Marketing

The main value proposition is **energy savings**. Energy savings are promoted to reach “warm and comfortable living”.

The main communication channel is the MMM website. Further communication is organized on location, initiated by various municipalities or non-profit organisations. This includes 1:1 informing home-owners (‘Door2Door’) sometimes followed by consultancy at the home (‘kitchen table talk’).

The website includes the option to develop an personal home file system, makes it possible to search contractors and offers useful information such as an energy label atlas. A request for offers can be done by the homeowner using a track&traces IT-instrument. The homeowner contracts a supplier and assesses contractor(s) after implementing measure(s).

Discussion

The structure aims at national coverage and engaging a large volume of contractors in executing energy saving measures. It focusses more on implementing of single measures than on total nZEB renovation. For the moment, it is not clear how the structure really initiates supply chain collaboration. Also, the quality requirements do not offer real guarantees.

4.5.3 Provincial initiative (The Netherlands)

Collaboration

The “Energy Board” is a **provincial structure** that binds various actors in the development of a joint renewable energy agenda for North Holland. It assembles an organization for the economic development of the renewable energy sector in North Holland, a provincial service point for renewable energy that supports municipalities, a Chamber of Commerce, a development company, a harbor development structure, a public-private collaboration for innovation in the agricultural sector, and a collaboration structure between knowledge institutes, educational facilities, companies and authorities. The Energy Board is also supporting the development of BIK. One development initiative (Urgenda) concerns making private homes energy neutral in a faster way.

The Energy Board is involved in various projects that concern supply chain collaboration. One effort concerns the development of a concept Renewed Living (‘Hernieuwd Wonen’), where houses from the 60ies and 70ies get a deep renovation in about five days with a budget of about 50.000 € per house.

Customer segment

The initiative is just starting and no specific customer segment is defined. As a pilot in 2014 the first twenty homes will be made energy neutral on the island of Texel.

Marketing

The initiative worked bottom-up. The **home-owners themselves** have thought about how the renovation should happen. Contractors and installers have been trained by Urgenda.

For financing Urgenda applied for funding at a participation fund for sustainable economy. The Energy Board helps to make the efforts of the Urgenda visible and offered to contribute to the development of the plans.

Discussion

The success of this initiative is not yet visible.

4.5.4 Municipal initiative (The Netherlands)

Collaboration

The foundation is a joint initiative of a **municipality** (Amersfoort) and the (local) private sector to make the building stock more sustainable.

The organisation assembles a consortium of companies: building **contractors, installation companies, adviser, marketing** and a **bank**. The foundation is supported by the municipality of Amersfoort mainly through process activities and tools. For example, the municipality provided heat loss images for all houses in Amersfoort and a sun shading tool for solar panels that inhabitants can use. Within the foundation all individual firms are liable for their own work.

April 2014 a centre for sustainable renovation opened its doors in Amersfoort, to inform homeowners about energy savings. This centre is a joint initiative of the organization and two other actors. One is the leading market **supplier in professional building products** and developer of the sustainable trademark Greenworks. The other is a local **education centre** for the construction sector.

Customer segments

The organisation is not focussing on specific customer segments, but acts mainly local. Generally, clients are above 40 and are households with children.

Marketing

For the organisation, a passive house calculation is an important tool to **guarantee the energy performance and generation**. Clients find it important being offered the guarantee of the **process quality label** 'Bouwgarant', to be sure about the process quality and especially the realization of the work in case of bankruptcy of the contractor.

At the time of the interview the main contact with the homeowner was a website. In the centre for sustainable renovation a "Renovation house" is put central. Within this house homeowners are **informed** about energy saving measures, including a **cost estimate** and expected energy savings.

Discussion ²⁷

Clients are welcomed for energy advice, condition assessment, design, financial advice and realization. Home-owners are not bound to work with firms connected to the organization. Consultants and municipality will advocate their proven quality, but the client chooses.

The process till the realization is often quite long and costs a lot of money, delivering several reports. The organization experiences that it is difficult to convince homeowners to take decisions, they want to have alternatives during the whole process. Therefore the organisation believes it has to think about methods to let the clients pay for the advice. As a solution it thinks about a (revolving) fund for offers of the supply chain and/or asking small percentage of project income for the work of the central organisation, marketing, advice.

Although the need for energy performance guarantees is highlighted, involving a quality assuring actor is not evident. The organisation also experiences a need for a regulation to enter the foundation.

4.5.5 Association (Austria)

Collaboration

The cooperation structure involves an **association** for the advancement of efficient and environmentally-friendly use of energy, an **educational institute** for the construction industry, a regional **Chamber of Commerce** and **ten construction companies** (general contractors). The collaboration structure is still new and in the development stages.

Each project is managed by one general contractor, which applies for this work. The individual general contractors work together with their own sub-contractors and are the responsible contact partner. Contractors work according to the guiding principle "everything in one hand"; engineering contracts must fulfill certain parameters.

²⁷ See also (in Dutch): Budde, P. and Gruis, V. (2013) Opgave: in 3 jaar tijd 3.500 woningen energetisch verbeteren, Tijdschrift voor de Volkshuisvesting 19, april, pp, 34-38.

Most of the specific activities regarding nZEB housing renovation are carried out by the general contractor, for example the diagnosis, planning, executing and hand-over phases), informing and marketing activities take place at two levels – information for end consumers and information for construction companies.

Customer segments

Regarding the specific customer segment the interview partner named owners of traditional detached or semi-detached houses, also considered for larger apartments or public buildings and perhaps the tourist industry.

Marketing

The association present a **transparent process** and an accompanying **quality assurance** throughout the whole process. The main advantage for homeowners is to receive a certain **standard** or a specific standard of quality out of one hand. The definition of nZEB renovation is oriented around the “klimaaktiv Gebäudedeklaration” a standardised renovation code of practice in Austria. This building standard is **linked to the granting of subsidies**. Respectively, **energy performance guarantees** are covered by the klimaaktiv standard as well as sustainability issues, however the **use of ecological building materials** is promised as a minimum. In addition to that, the consortium is responsible for ensuring quality through **compulsory training**. Five educational modules and additional further education, for example the renovation of historical buildings, are obligatory for each partner and further modules will be offered following this. Project partners also have to take part in regular cooperative meetings where they share their experiences and find solutions in a collaborative way.

The coordination of activities among the partners is based on a collaborative renovation and energy concept. The renovation follows a code of practice which is strongly linked to the klimaaktiv building standard. Information about the requirements and the procedure is given in the first meeting with the customer. The homeowner can also rely on a transparent cost and time plan including scaffolding costs for example. The post-occupancy follow up is usually carried out by the general contractor, but at a superior level, i.e. the consortium carries out random checks / building certification to ensure the renovation concept has been properly transferred and to ensure the quality of the execution.

Homeowners can find the association on the web. Other media are traditional information channels like regional and local media, articles or features in magazines.

Discussion

The main advantage for participating companies is differentiation from competitors.

According to the interviewee “much convincing is needed” to incorporate sustainability issues. An integral part of the project implementation is the requisite photo documentation, a building diary and an examination of whether the building is airtight.

4.6 Discussion: Barriers detected from emerging collaboration structures in various countries

Tables 1 and 2 summarize the key barriers that were detected from the interviews with the lead actors of emerging collaborations.

Both contracting and consulting actors highlight the existence of poor on-site execution and the need for improvement regarding quality assurance. In particular, consulting actors see the need for energy performance guarantees and requirements for testing. Some contractors see problems with on-site coordination. A contracting actor finds it difficult to develop processes per individual homeowner. Consulting actors notice the long realisation processes. Many interviewees think that such problems can be avoided with knowledge transfer during construction and planning processes and/or optimizing the information flow between professionals.

Contracting actors appear to have difficulties organise their timing according to the homeowner situation. Consulting actors notice the lack of knowledge of the homeowner and the lack of information to the homeowner. This makes it difficult to convince homeowners to take decisions. We note that various contracting and consulting actors expect the homeowner to be responsible for maintenance or future works.

Consulting actors sometimes have difficulties to manage budgetary constraints and requirements of the homeowner. Consulting actors and a contractor show concern that the implementation of sustainable measures (energy saving, social concern) increases cost.

Contracting actors observe that the market for nZEB SFH renovation is still small and that nZEB is yet to be defined. There is strong competition with 'unserious' actors. Therefore, contractors express a need to emphasize their strong points and differences with other companies.

The growing competition between companies is also observed by consulting actors. Owners can contact a contractor directly. They generally have more interest in non-energy related issues and even can ask for lower ambition levels. According to interviewees, homeowners show prejudices towards new ways of construction.

Consulting actors are confronted with homeowners who might not be ready to pay for planning or project management services. This might be due to their lack of understanding of these services or to lack of communication with homeowners. Consulting actors express a fear of the homeowner towards long payback time and look for better ways to express the evaluation of energy saving measures. Contracting actors also have difficulties to communicate added value instead of added costs. A consulting actor finds that the pricing model should be revised so that their income is not related to the project cost.

Various interviewees express a lack of knowledge. This relates for example to the lack of awareness of the customer segment and the market potential. A contractor expresses the need to engage information from neutral sources. A consulting actor is also concerned about its own lack of knowledge about installations. Another contractor notices scepticism of the homeowner towards ventilation systems.

Some consulting actors are small which does not allow them to do big marketing campaigns. A hardware store is concerned about its limited space for showing solutions.

The main issue for various actors is a lack of trust of the homeowner towards non-independent parties. This makes it challenging for both contracting and other actors to find the right balance between providing independent advice and delivering an integrated solution.

Table 1 Process barriers for business collaboration in the nZEB SFH renovation market, detected from interviews with lead actors

Key barriers observed by lead actors who organized collaboration for the realisation of nZEB SFH renovation (process related)	
<i>Contracting actors</i>	<i>Other actors</i>
Lack of knowledge	
lack of information from neutral sources	lack of knowledge about installations
no exact and uniform definition of nZEB	lack of awareness of the customer segment/ market potential
homeowner's skepticism towards ventilation systems	clients don't know the services
	lack of knowledge of the client
	difficult to convince homeowners to take decisions
	lack of knowledge of the energy advisor about implementation
Inefficient construction processes	
poor on-site execution/ lack of knowledge	poor on-site execution/ lack of knowledge
lack of on-site coordination/ cooperation	suboptimal information flow between professionals
timing according to homeowner situation is challenging	long realisation processes
personal contributions of homeowners to consider	engage homeowners to do after-care
Insufficient quality assurance	
improvement needed for quality assurance	lack of checklists/ manuals
	need for energy performance guarantees
	lack of requirements for testing (airtightness)
	little tradition with written contracts for SFH renovation
Lack of independent advice	
challenge of balancing independency and a total integrated service	challenge of balancing independency and a total integrated service
	lack of homeowner's trust towards non-independent actors
Communication difficulties	
need to emphasize strong points/ difference with other companies	lack of good communication with the client
	lack of information to the client
	partners do not share enthusiasm/ (concept) knowledge

Table 2 Market barriers for business collaboration in the nZEB SFH renovation market, detected from interviews with lead actors

Key barriers observed by lead actors who organized collaboration for the realisation of nZEB SFH renovation (market related)	
<i>Contracting actors</i>	<i>Other actors</i>
Inadequate pricing model	
ability to communicate added value instead of added costs	homeowners are not ready to pay for planning/ project management
	pricing model should not be related to project cost
	perception of cost of energy saving measures
	budgetary constraints/requirements of the homeowner
	including sustainable measures makes the company too expensive
	fear of the homeowner towards long payback time
Unfamiliarity with collaboration	
companies are not familiar with cooperating	understanding the working methods of different trades
limited capacity among the partners	lack of clarity about supply chain integration
	coordination between different actors is a challenge
	need for requirements for entering a collaboration
	fear of loss of cooperation with other actors
	actors have different lengths of periods of warranty
Competition in the market	
competition with unserious actors	prejudices regarding new ways of construction
projects including social sustainability difficult to sell	growing competition between companies
	many homeowners contact contractor directly
small market observed	
Small company size	
process per homeowner is less interesting	limited space for showing solutions
small size of the own company means less competencies	small size of the company does not allow big marketing

Various collaboration structures do not have a clear **customer segment** that they address. Some regard the SFH renovation market already as a niche that does not have to be narrowed (not even up to energy-saving), while others have a clear view on the age, the income level, the family composition, the budget, the (energy) interest, the building type and the geographical location of customers that they want to address.

When looking at the mentioned **customer values**, especially the more 'traditional' collaboration structures appear to rely on their reputation and emphasize that customers easily find them and trust them. Newer forms of collaboration structures put more emphasis on their price-competitiveness, quality standards and knowledge about energy performance or ecological materials, even up to the level of delivery of guarantees and obligatory training of collaborating actors. Comfort, energy performance, sustainability, and unburdening - from assistance in grant applications to comparing offers to taking care of all aspects resulting in minimum inconvenience - are often reappearing as targeted customer values.

The use of **communication channels** mostly reflects how well the collaboration structures have thought about the customer segment and the customer values. While some collaboration structures use sophisticated communication platforms and tools and energy labels, other (more 'traditional') collaboration structures still mainly rely on word-of-mouth and visibility of their projects. Some deliberately do not use any media, others do remarkable experiments with various media, door-to-door campaigns or guarantee contracts.

Before analysing opportunities for collaborative business development, we first examine the results of discussions in national workshops, where frontrunners – such as those described in this chapter - were asked to jointly express barriers and needs for the nZEB SFH market development.

5 National workshops

The national workshops gave further qualitative information based on the experiences of supply-side frontrunners and other supply side actors. Whereas the interviews could go in-depth and deal with sometimes sensible topics and personal information, the goal of this workshop was to obtain general background information for the market development, to learn how frontrunners generally talk about issues related to nZEB SFH renovation, and to stimulate the generation of new ideas and impressions of services. Using group dynamics in two or three groups of typically six to twelve people, participants reacted and built upon each other's responses. As moderators, the COHERENO partners detected the most important barriers and opportunities for collaboration and quality assurance in the nZEB SFH renovation market, which resulted in recommendations for emerging collaboration structures for stepping into the nZEB SFH renovation market.



Figure 8 Impressions from a national COHERENO workshop in Belgium.

5.1 Austria

Experiences from the organization

The Workshop in Austria took place on January 30th 2014 in Vienna and was combined with the second meeting of the National Advisory Board. The title of the workshop was “Are you ready for nZEB-renovation? – Erfahrungsaustausch zwischen Frontrunnern und ExpertInnen aus dem COHERENO National Advisory Board.” 14 participants took part in the workshop. Two short presentations were held by architects, introducing nZEB renovation examples to the audience. The two examples were selected in relation to demonstrate a success story and on the other hand a renovation example, where quite a number of very useful “lessons learned” can be drawn, i.e. a complex and difficult renovation example.

Architect DI Heinz Plöderl introduced a best practice renovation example describing the existing collaboration structure. It is more a loose structure, informal networking of established actors, who constantly collaborate and exchange their experiences. Referring to the **quality assurance** Heinz Plöderl indicated that this issue is **apparently neglected** by contractors due to manifold reasons (e.g. lack of general understanding of professionals, no or not sufficient training and education, etc.). According to the architect the current practice mainly puts its **emphasis on investment costs** whereas life cycle costs are not considered although showing a significant economic benefit over the life time.

The second presentation was held by architect DI Patricie Taftova. In her presentation she described a renovation project in Brno, Czech Republic. A former SFH was renovated as well as the living space extended. The homeowners can be characterised as middle age, high level of education and a very good knowledge of nZEB. One of the major problems was the coordination of the different actors involved; contractors from Austria were concerned with planning whereas contractors from the Czech Republic were mainly executing tasks. This matter of fact was important to the homeowner, who had a lot of **confidence and trust in local actors**. Emerging problems included the professional installation and **handling of the ventilation system** or the **correct use of materials**, such as a plaster which should guarantee the natural regulation.

Experience exchange related to construction phases

Considering the *diagnosis and analysis phase* it has been recognised that an **independent and professional energy advice** is crucial as a starting point for renovation works. Nonetheless, the main objective should be a holistic renovation. The energy advice must assist with the priority setting for renovation measures **adjusted to the personal life situation of the homeowner**. It was stated that it is necessary to get the homeowner “on board”, therefore offering flexible solutions like:

- Solving threshold problems: First on-site quality **inspection and consulting have to be low-cost and compulsory** in order to get a financial grant
- Partial renovations are more likely to be financially manageable than a total renovation
- Early information about costs and benefits of each measure
- Experts offering more practical knowledge than theoretical knowledge
- Generate enthusiasm: important motives are gain of **comfort** and the **increase of value and image**.
- **Development of a network** of interested companies, professionals and experts

Other aspects mentioned in the workshop reflected the **lack of training** of all actors involved, the **absence of a holistic renovation concept** in many cases or the fact, that banks and funding authorities sometimes create **no incentive for high-standard** and holistic renovations.

As in the diagnosis phase **insufficient knowledge** of actors involved in the renovation is also in the *design and planning phase* prevailing. Possible solutions are comprehensive **training** of the individual professional groups and to **create a common understanding**, because many courses are said to be biased and too superficial. Whereas, **plausibility checks of the concept by a third party** could overcome flaws in the plan of the architect or adviser.

Regarding the *execution phase* a **good management and coordination** as well as final quality controls are basic elements for a successful renovation accordingly. It was suggested to introduce **compulsory photo documentation** which should be managed by the coordinator. In case of a missing documentation, especially if results are not clearly traceable afterwards, a **contractual penalty** should be considered. In order to detect construction defects **mandatory controls** (e.g. blower door, thermography check) should be established right after completion of the component. It has been pointed out that regarding the replacement of windows, more effort on comprehensive **training** and education is necessary as this is of relatively high importance.

In the *hand-over phase*, final quality controls should be linked to financial **grants as a “must-have”**. After a certain period of time the building and the HVAC system should be **technically adjusted** for reasons of reconciliation and to check the main settings. To a lesser extent, the discussion in the groups concentrated on issues concerning the **delivery of instructions to homeowners**. As the level of technical functionalities and enhanced building indoor comfort is increasing, user-friendly manuals with instructions for operating service systems and for maintaining building and service components are getting more and more important. The aim is to create a basic understanding and to specifically point out the advantages (e.g. increased comfort, health, quality of life).

Use phase: There was a controversial discussion if and how missing or insufficient **monitoring data** of actual energy consumption should be **linked to the payment** of financial grants and subsidies. In many cases it is difficult to determine the source of error and to explicitly identify the problem, i.e. is it a technical problem, a flaw in the concept or an operation error caused by the homeowner. An **evaluation and adjustment** of building technology and home control after a certain period of time will be essential.

To sum up, for contractors, planners and architects the factors of success and correspondingly the basic for the establishment of collaboration structures are quite clear:

- Careful planning and project monitoring
- Simple and tailored solutions that do not overcharge owner-occupants AND executing companies / contractors
- Executing companies with well-trained employees
- A good supervision of construction

Experience exchange related to quality assurance

Regarding quality assurance, the executive companies / contractors altogether highlighted the importance of the topic “**Better education and professional training**“. There are often flaws during a qualitatively demanding renovation due to a lack in professionals, which also hinders the successful collaboration of actors.

There was a controversial discussion, if collaborations between actors involved in renovation (e.g. energy consultants, planners / architects, contractors) are helpful to improve quality. On the one hand, it is considered necessary that there is an **exchange of experiences between experts** to increase the quality of renovations. On the other hand, these networks only work, if there are “**no secrets** from each other“ and if there is “no standstill“ within the whole renovation process.

The proposed solutions were quite similar in both groups:

- There is a need for a **comprehensive renovation concept**
- Starting point for the increase of know-how of the professionals could be something like the “**Competence network** old-house renovation”
- Of importance would be a program, which shows the renovators, **which measures are most urgent** and which are not (such a program is available in Germany)
- Change of the funding towards a “**step-by-step system** for renovation” would be helpful
- Moreover, it is necessary to **meet the owner-occupant** where he/she is standing – and to consider the stage of life of the owner-occupant, when the renovation is carried out (somebody, who retires has less money and does not want to invest so much)
- The **personal profit of a renovation** has to be better displayed (comfort/indoor climate) – the discussion should not only cover the financial costs but also the benefit for the occupants
- Change of cost structure towards a rent that includes heating: the quality of the building envelope would be more relevant (applies more to multi-family homes)

5.2 Belgium

Experiences from the organization

A first workshop in Belgium took place 6 February 2014 in Kamp C, Westerlo, Belgium and was organized by the Flemish Institute for Technological Research (VITO), Passiefhuis-Platform vzw (PHP), and the Flemish Contractors Federation (VCB). It was attended by about 20 people involved in construction works: contractors (majority of participants), researchers, architects. As a follow-up a second workshop was done with members of Passiefhuis-Platform (various types of companies) which took place 16 June 2014 in Mortsel and which focus on the detected key area of **phased renovations**.

During the first workshop, William Van Den Berghe, research and development project leader at turnkey supplier Bostoën, spoke from the perspective of the contractor and the architect and provided an example of a SFH renovation. The company has built more than 26% of the total floor surface that meets the passive house standard in Belgium. Since they deliver new buildings that are not prefabricated, they considered energy renovations as well. The second example consisted of a renovation by architect Christophe Debrabander of an old farmhouse, in which Bostoën had a role of advisor. Characteristic of this renovation was the preservation of authentic character on the one hand combined with a modern extension on the other, and the fact that the owners remained living in the house.

Reacting on questions from the audience, the presenter stated that Bostoën mostly focuses on an **economic optimum** instead of only focusing on minimizing the energy use. The example of the farmhouse was probably more expensive as a renovation compared to demolishing and reconstructing, but then the authentic character would be lost.

Experience exchange related to construction phases

Regarding the *diagnosis/analysis phase* the participants noticed that the most important barrier is the **lack of sound independent energy advice** as a starting point for planning renovation works.

For the *design/planning phase* the participants were mainly concerned about **flaws in the concept/plan** of the architect and/or the plan. Targets were sometimes badly translated into technical specifications.

Concerning *execution of works*, participants found important barriers to be **inadequate**

product choice, not according to instructions or product guidelines, and **lack of on-site coordination** and cooperation between various parties involved.

During the second workshop similar concerns were expressed by various participants, this workshop stressed more importance at the design and planning phase and regarded the main problem to be **insufficient knowledge with the architect/advisors** on practical issues. However, the feeling is that this is changing and that architects to date are navigating a transition phase (with respect to knowledge acquisition), attending courses and trainings. The knowledge of the actual executer was also expressed to be a problem. For this problem **education and training** was agreed as the best and only solution by all group members. Knowledge has to be shared and spread, education has to encompass also learning about existing and new components in the market, and **on-site experience** – reckoned essential - has to be ensured for instance as part of training programs. Working according to codes for good practice was also seen as important by the group yet as one group member said “codes are numerous, and professionals have to know them in the first place”. Next to that, it appears **working in teams or ‘toolbox meetings’ could enhance the learning effect**. One participant added to that the possibility of developing and working according to checklists specific for renovation.

Concerns were expressed that some clients do not even know how their ventilation system works and that the end user is per se lazy (to become informed). In addition to that, a participant highlighted that it is often not possible at all to instruct the homeowner. For example, when a technician comes to do the maintenance, he often finds the grandfather/grandmother or whomever who has stayed home while the actual homeowners are taking children to school or at work. Also, concern was expressed that energy monitoring may not apply that much for private housing as it does for service buildings. To solve this problem **mandatory maintenance contracts** and providing clients with **maintenance protocols** - so that they become involved - were discussed.

Experience exchange related to quality assurance

This special issue was only discussed during the first workshop. The participants noted that most of them already follow additional training programs and courses about (energy/comfort upgrade) renovations. Various actors also try to increase quality of works by using independent guidelines or codes of good practice or by learning from on-site experience.

The participants were mainly keen to work in the future more on **properly informing all actors** in order to agree to deliver an aspired end result (on a trust/informal basis). Also the idea of a **quality label for the advisor or the advice** found resonance.

5.3 Germany

Experiences from the organization

In cooperation with the Chamber of Craft for Oberfranken, dena organised the workshop for Germany in Würzburg. The workshop was entitled “One-stop shop for energy-efficient renovation” and was held 27 February 2014 at the premises of the Chamber of Craft for Oberfranken, Center of Competence for Energy Technology. 15 energy efficiency experts participated. Three of them presented examples of their experiences and another architect who works as an expert for construction (accompanying quality surveillance) undertook the role of an external observer. The participants were craftsmen, architects and engineers – all experienced in energy-efficient renovation and building.

Experience exchange related to construction phases

The three main discussion points were:

- a **fluent process** from consulting, planning and construction
- a **customer-oriented approach** and
- **education and knowledge** about energy-efficient renovation process

The first point concerns the way of collaboration and coordination to have a fluent process. Everyone underlined that it is important to have **one person being responsible for coordinating** the construction process. Architects saw themselves in this role; contractors preferred having an independent expert accompanying the construction process from the beginning to the end. Some examples of networks of contractors have a person only for coordinating dates of contractors and for being the contact person for home-owners. On-site conferences are not so spread, but the telephone is really important to **communicate with partners** and other enterprises. Everyone has to know what to do and everyone has to think about his own work and the effects on the work of other crafts. All participating trades have to have the **knowledge about the trade-spanning interfaces** during the construction / renovation process.

Experience exchange related to quality assurance

A feasible **planning** is very important to have less problems during the building process. It should be holistic and it should **include time, costs and realistic estimation of things to be done**. Also the **monitoring of work**, the **on-site quality control** in time and the (voluntary) **monitoring of use** of technics and living in an energy-efficient home after finishing work is part of it.

This goes along with the creation of customer confidence which is really important. From the point of view of the participants, clients need a contact person for all the stuff around the building process. It is important to have the energy advisor nearby as from the first meetings. And it is also important to **keep the home-owners motivation** for nZEB renovation all the time. So they should be integrated into the on-going of the construction process. Participants agreed that it is important to **maintain contact after finishing the project**. After renovation a **hotline** could be an idea to solve problems of technics and living in a nZEB. Another possibility to care the customers is to include them in **mailing actions or phoning** them one year after renovation to gain feedback about their satisfaction and experiences of living in a nZEB.

Some experts criticised the **non-existing know-how about nZEB renovations** among their colleagues. They proposed to include this theme more intensive into the study of architects and the education of craftsmen. It should be integrated into the apprenticeship. Also a **certificate** for craftsmen after attending a special course of energy-efficient renovating could prove their knowledge and makes it visible for home-owners and other contractors. The participants proposed working with **reference objects** too, so everyone could see the results of their work.

5.4 The Netherlands

Experiences from the organization

The Workshop in the Netherlands took place 4 February 2014 in Delft and was entitled “Brengt u BENG-renovatie? Ervaringsuitwisseling tussen voorlopers en professionelen” [“Do you deliver nZEB-renovation? Exchange of experience between frontrunners and professionals”]. The workshop attracted 21 external participants. Three groups were moderated by three members of TU Delft. A full report in Dutch can be downloaded from the

Dutch national COHERENO web pages²⁸.

One presenter showed an example of a renovation of a SFH towards passive house standard and discussed how collaboration can emerge during specific toolbox meetings (“**scrum teams**”). Another contractor presented new developments in **collaboration to educate craftsmen**.

Experience exchange related to construction phases

Considering the *diagnosis and analysis phase* the participants recognized that it is important to **establish (energy) requirements from the beginning**. They emphasized the need for **better, integrated, independent²⁹ and clear advice** for the homeowner (and other professionals). They suggested to **help the homeowner to formulate requirements** using a programme of requirements to ensure good communication. Some participants suggested **optional guarantees**, which in turn requiring attention during the delivery phase. Others further suggested to **work with experienced professionals** or to demand requirements regarding the (building physics) education of energy consultants. One group suggested the development of **workshops** and **renovation stores**, providing one contact point for the homeowner from advice to post-occupancy.

In the *design phase* all participants emphasized the **need for collaboration**. Some linked this to the need for transparency between professionals and the wishes of the client concerning energy use. Various participants noticed the need to use **construction teams**, defining responsibilities of each member. The same groups also recommended the presented ‘**scrum team**’ approach. Some companies further speculated on using **concurrent engineering** or **morphological design methods**. Other participants speculated on the development of a **database of products and solutions**. One group noticed that a barrier for a good product choice can be that Dutch standards (for example KOMO certificates) protect the national market.

Regarding the *execution phase*, all participants confirmed **limited knowledge of craftsmen** (lack of education, particularly for contractors and installers). Various participants emphasized the need for **exchange of experiences between professionals**. Strict planning of construction sites appears to create a difficult framework for education on site and trust-building³⁰ and involving experienced professionals is needed. **Existing platforms** could be used to provide additional education. On the one hand, lack of coordination can be countered by using a **process manager**. On the other hand, it makes sense to make each actor of a construction **team responsible for the end result**, applying consequences to minimal and maximal performance. **Lean construction** methods were proposed, as well as continuation of scrum teams. A lack of quality control on site is a problem: some participants suggested a role for the homeowner to control professionals.

Considering the *delivery and use phase*, all participants identified the need to better inform, even “**instruct**”, **the homeowner** about the use of the renovated house and its installations. Two groups suggested the standard delivery of a **multi-annual maintenance plan**. The other group suggested to develop creative solutions to **make information easily understandable** (such as apps). Some participants highlighted the need to **improve control methods** during delivery and detected the need to permanently **monitor real energy use** according to guarantees. According to some participants, monitoring can be done by the homeowner. It was suggested to give the homeowner access to a digital log book.

²⁸ <http://www.bk.tudelft.nl/over-faculteit/afdelingen/otb/onderzoek/onderzoek-en-advies/innovatieve-bouw-en-onderhoudsprocessen/cohereno/>

²⁹ Group 2 remarked that it is more important that the language in which the professionals speak should sound independent.

³⁰ A problem appears to be the lack of involvement of executing companies, who are often hired locally by a general contractor.

Experience exchange related to quality assurance

The three groups came up with different viewpoints when discussing in-depth the aspect of quality assurance.

According to Group 1, it is essential to **define new ways to work with performance requirements**. Various existing instruments can contribute to such development, such as the **EPC**, “**quality contracts**” and **performance specifications**. The collaboration should develop a **risk analysis** based on the wishes of the client regarding energy performance. The problem remains that actors do not have a lot of experience regarding the delivery of nZEB and that they need guidance for defining such requirements. Related to the performance approach the delivery phase also needs to be improved, where the collaboration structure should **develop ways to easily communicate with homeowners**.

According to Group 2, **additional learning is needed regarding renovation processes**. However, following a course does not guarantee having the knowledge on how to do things. Better understanding needs to be created of the work of each discipline in a team. As a major solution, the collaboration formula ‘**renovation store**’ **should be developed further**. Such a collaboration can deliver all actions needed without breaking the supply chain activity in construction phases and can communicate in the language of the homeowner. Also in such collaboration, the homeowner can experience visible solutions in a ‘show room’. An important problem these collaborations now have is that they have to gain the confidence of customers, while general conscience about energy saving opportunities is only developing slowly.

Group 3 emphasized the need to **involve and educate craftsmen on the project level**. Particularly the collaboration needs to create a “conscience” for craftsmen and independent professionals and invest in their education and interaction. To educate independent professionals another structure is needed with targeted short modules given by experienced professionals on the project level.

5.5 Norway

Experiences from the organization

The workshop with Norwegian frontrunners took place as a part of the National Advisory Board Meeting in Oslo on 4 February 2014. Beside the three Cohereno researchers there were 10 participants. Three of the participants represented different public funding actors, one represented the home owners and the rest represented different roles on the supplier side. Due to the size of the group the whole workshop was run as one group.

Experience exchange related to construction phases

The group pointed out some main problems for nZEB renovations. First, the group pointed on various **technical aspects often going wrong** during the *planning/design phase*. For example, ventilation and fans sometimes produce too much noise which can be avoided by propitious positioning during design phase. For example, heating systems are being over-dimensioned, as actors overestimate the need for heating in a passive house. Finding the right kind of technical installation can also be too difficult (correct dimensioning). The design is not being performed with enough holistic perspective.

There is a **need for competent actors** that know the entire process and are able to see the entirety of the project under one loupe. For example, there is generally too little knowledge about the change of the building physics due to thermal insulation: extra insulation usually requires a ventilation system. The participants observe **low awareness of learning from own work**. Check and control of the work carried out is rarely practiced.

The participants pointed on problems regarding collaboration throughout various phases in renovation projects. “Actors should capture what the building requires, but **ALSO capture the family's needs, requirements and priorities**”: this sets the guideline for all other trades contributing within the building process. **Communicating qualifications** is needed: architects have skills leading the design and building process, this should be communicated and respected. Often there is a **lack of expertise within building physics** amongst workmen working with heating systems and ventilation: this often results in less focus on the projects entirety. The participants observe there is a lack of “recipes” on **how workmen should work together** during the entire building process; who shall come in when, when to test air tightness, and so on. There is also too little interdisciplinary collaboration and **insufficient knowledge of each other's trade**. There exists a culture or **fear of losing on a collaboration** where the entirety is being stressed. For example, a plumber might recommend a solution that gains the entirety of the project, but this can result in less supply of products that the plumber can profit from. A challenge remains to get all actors to play at the same team. Other remarks include lack of communication on a superior level and lack of air tightness testing.

To answer the question what often goes less well today, the group concluded by summing up four main points:

- **Blurry goals** or no clear goals at all for the end result – which all actors have to act in accordance with.
- **Low self-control and verification** of work carried out – not a culture of learning from your own work.
- **Lack of use of team work** and interaction contracts. Limited clarity of roles and interplay.
- **Actors not being responsible together** for the end-product. This leads to lack of a holistic perspective – including both building and families' needs.

During the discussion of how to avoid these problems, several points came up. First, **team-play/interplay contracts** can be used where all actors agree about the quality of the end-product: a common goal through the process can contribute to better team play and better end-results. Second, better planning is needed: a culture should be developed to **use architects and consultants** in the small-house market. Third, instead of giving a little support to all projects it was suggested to give **proper support** to those who really aim to run at the front and to achieve better solutions. Finally, actions are needed that promote better understanding and **insights about each other's trades**: this should lead to increased respect of each other's roles, qualifications and contribution in a project.

Experience exchange related to quality assurance

One participant remarked that a competition in air tightness testing between their building contractors was fruitful: “They like to check how airtight they can build houses”. Another participant questioned the craftsmen’s honesty and knowledge about renovation compared to new housing. This led to a discussion whether another mindset is needed for renovation compared to new constructions. There is still a **lack of regulations for small renovations** and **lack of written contracts** is widespread. It was proposed that contracts become mandatory standards, regulating in the contract the progress, economy, goals and so on. This is not common today. Projects are often actuated immediately which leaves little time for formalities. The craftsmen are also usually not the initiator for contracts, but contracts are often carried out if the homeowner asks for it. The experience is that the building sector performs well in what is regulated by contract, but what is not regulated by contract they don't care about. Thereafter, a need for requirements or a **technical regulation** (TEK) for renovation was proposed. “Homeowners only buy once, building contractors sell many times.

We have to make the building contractor better!” A participant remarked that if contracts and **checklists** had been used actively in renovation projects, a lot of aspects of quality assurance would be covered. **Workshops** were proposed to be a good model for sharing knowledge and a great way of going into projects together.

5.6 Discussion: Barriers for collaborative business model development

Similar barriers as discussed in Chapter 4 reappeared during the national workshops with frontrunners and were also related to construction phases. The various workshops in different countries had a different dynamic regarding the observation and discussion of challenges and solutions in the volume market of SFH nZEB renovation. Nevertheless, in all countries the top three problems to step into (collaboration for) the market of nZEB housing renovation in the partner countries related to lack of knowledge, inefficient planning and construction processes and lack of quality assurance. Similar concerns were expressed in all countries, such as the lack of training and education of professionals, the attention needed in the design phase, and so on. Next to the barriers listed in Tables 1 and 2 the participants of the workshops also showed concern about:

- inadequate product choice
- incorrect use of materials
- absence of a holistic renovation concept
- lack of expertise within building physics
- lack of responsibility for the end product.
- lack of a culture of learning from carried-out projects
- specialized needs for education of craftsmen
- need for financial support from policy
- lack of regulations for small renovations

6 Opportunities for collaborative business model development

6.1 Detected opportunities

We conclude with the detected opportunities for collaborative business model development. The partner country experiences show that there are many new types of collaboration opportunities (see also Examples in Chapter 3).

The research in Chapter 4 finds that emerging collaborations for the realisation of nZEB SFH renovation go beyond the 'traditional' collaboration structures between contractors, architects and engineers. On the next page, Table 3 summarizes the types of emerging collaborations that were found in the partner countries (section 4.1). The Table illustrates that many kinds of collaboration structures are possible to address the nZEB SFH renovation market.

Table 3 Emerging collaborations in five European countries for the realization of nZEB SFH renovation

	General contractor	Contractor components or services	Architect/planning office	Independent professional/expert	Supplier	Bank	Education-institute	Home-owners	Company network/federation	Hardware store	Chamber of Commerce	Marketing company	Municipality	Other:
COLLABORATING ACTORS														
Contracting actor as lead actor														
Contractor 1 (Belgium)		x		x										
Contractor 2 (Belgium)	x		x											
Contractor 3 (The Netherlands)	x	x	x											
Contractor 4 (Norway)	x	x	x	x										
Turnkey solution supplier 1 (Austria)	x			x		x								Broker
Turnkey solution supplier 2 (Belgium)	x	x												
Group of companies (Norway)	x	x	x											
Installers (The Netherlands)	x	x		x										
Consulting actor as lead actor														
Architecture company 1 (Belgium)		x	x											
Architecture company 2 (Belgium)		x	x	x			x							
Architecture company 3 (The Netherlands)	x		x	x				x						
Architecture company 4 (Norway)		(x)	x											
Architecture company 5 (Germany)			x	x					x					
Architecture company 6 (Germany)			x	x					x					
Planning company (Germany)			x	x										
Network of planners (Austria)			x	x										
Project manager (Norway)	(x)			x						x				ENOVA
Energy advisor (Norway)			(x)	x										
Renovation store as lead actor														
Hardware store (Norway)		x								x				
Renovation store 1 (The Netherlands)	x	x		x					x					
Renovation store 2 (The Netherlands)		x		x				x						
Supporting initiatives involving public actors														
Expert listing in databases (Germany)	x	x	x	x										
Building sector initiative (The Netherlands)	x	x							x				x	non-profit organisation
Provincial initiative (The Netherlands)							x		x				x	public/private institutes
Municipal initiative (The Netherlands)	x	x		x		x								
Association (Austria)	x			x			x							

The experiences in the partner countries illustrate that **lead actors** that organize their collaboration for the nZEB SFH renovation market can be – as suspected - general contractors, turnkey suppliers and project managers. It was found that architects/ planning offices, an energy advisor, a broker, renovation stores and a hardware store organized structures for nZEB SFH renovation. Also, a national policy maker, a provincial collaboration and a municipality were found to be able to facilitate collaboration structures. Contractors thus appear to compete with various other collaboration structures who take the lead for organizing nZEB SFH renovation.

The **actors that collaborate with** the lead actors are mostly ‘usual suspects’ such as contractors that provide components or services, general contractors, architects/ planning offices, independent professionals/ experts. Some lead actors have found collaboration with more unusual partners such as a bank, renovation brokers, a marketing company, or specific suppliers. Furthermore, some structures have agreements with policy makers, or with an educational facility or a non-profit organization to guarantee a high quality standard. On the more holistic level, some lead actors also actively engage a Chamber of Commerce, a federation or a development company. Remarkable is also that some collaboration structures engage experienced homeowners in their collaboration structure as a marketing instrument.

The collaboration with the contractor is now often sought by other emerging initiatives. From experiences in the Netherlands it can be observed that in the volume market covenants with major companies and initiatives for group action organized by municipalities will play a larger role for renovating high volumes of housing. We can speculate that SMEs will have to position themselves as subcontractor of major companies, in integrated renovation and construction services or in smart construction teams.

The national workshops provided many ideas from various countries how detected barriers (see sections 4.6 and 5.6) can be eliminated. This is shown in Tables 4 and 5. In general there are various types of barriers that a collaboration structure has to eliminate.

Due to their limited competencies, knowledge or resources small companies do not really have an alternative but to collaborate with other actors. They can build partner trust in loose collaborations – for example engaging in concurrent engineering or morphological design sessions - before stepping into formal collaborations where partners have no secrets from each other. In each case they should make use of networks of interested companies, professionals and experts to position themselves in this market segment. Their participation in trade-spanning activities can also facilitate finding collaborators.

It is in practice difficult to balance independency and a total integrated service. However, the homeowner only tends to trust independent advice. Independent knowledge is needed which can be found by collaborating with competence networks and by involving independent/experienced/certified advisers or offering labelled advice. The business model needs to make sure that advice is paid for.

It is important to gain customer confidence as an actor operating in the region of the homeowner and to think in customer-oriented packages. The homeowner should be engaged in all information transfer to keep enthusiasm. It is important that communication runs smoothly and that knowledge between all actors involved is continuously transferred across disciplines on the concept level. Education of actors is probably best organized on site or by using existing education initiatives.

On the one hand, construction processes can be made more efficient by training of all actors involved and regular checks. On the other hand, it is important to have a single trusted contact point for the homeowner; it can be recommended that this person fulfils specified goals (energy performance, timing, information transfer) and manages and coordinates the process. In each case, attention is needed for quality assurance and a performance-based approach, linked to sticks and carrots. The performances should be specified from the beginning and followed up with monitoring.

To address homeowners with financing difficulties, collaboration structures can address opportunities to show the costs and benefits of a step-by-step renovation and by offering administrative unbundling to apply for loans, grants and so on. In communication the added values (also non-energy benefits) and life cycle cost should be emphasized.

The opportunities to eliminate barriers for business collaboration in the nZEB SFH market are summarized in the Tables on the following pages.

Table 4 Process barriers and opportunities as observed from leading supply-side actors in collaboration structures for nZEB SFH renovation in five European countries

Experiences from collaborating supply-side frontrunners for the realisation of nZEB SFH renovation	
<i>Detected barriers (process related)</i>	<i>Detected opportunities (process related)</i>
Lack of knowledge	
lack of information from neutral sources	use competence networks addressing nZEB renovation
no exact and uniform definition of nZEB	create an incentive for high-standard nZEB renovation
homeowner's skepticism towards ventilation systems	provide better, integrated, independent and clear advice; use optional guarantees
lack of knowledge about installations	organize knowledge transfer related to the trade-spanning interfaces
clients don't know the services; lack of knowledge of the client;	develop workshops or renovation stores for homeowners
difficult to convince homeowners to take decisions	keep the homeowners' motivation for nZEB renovation at all time
lack of knowledge of the energy advisor about practical implementation	use certified energy advisors
lack of culture of learning from projects	organize learning from on-site experience and from working in teams; organize toolbox meetings; exchange of experiences between professionals
specialized needs for education of craftsmen	certificate for craftsmen after attending a special course; work with reference objects; use existing education platforms
lack of expertise within building physics	work with experiences professionals
absence of a holistic renovation concept	create a common understanding; use comprehensive renovation concepts
Inefficient construction processes	
poor on-site execution/ lack of knowledge	train all actors involved in projects; comprehensive training of professional groups; use checks by a third party; evaluate and adjust building technology and home control
lack of on-site coordination/ cooperation	improve management and coordination; compulsory photo documentation; contractual penalties; careful planning; make one person responsible for coordinating; monitor
timing according to homeowner situation is challenging	propose a feasible planning including time and a realistic estimate of things to be done
personal contributions of homeowners to consider	deliver instructions to homeowners
suboptimal information flow between professionals	provide simple and tailored information solutions that do not overcharge companies; make each actor responsible for the end result
long realisation processes	make sure there is no standstill within whole renovation processes; show what is most urgent
engage homeowners to do maintenance and further work	offer to check the main settings; offer maintenance contracts and protocols; maintain contact after finishing the project (mailing, phoning); make information easily
Insufficient quality assurance	
improvement needed for quality assurance	introduce mandatory controls; exchange of experience between experts; properly inform all actors; use quality checks
lack of checklists/ manuals	use checklists actively
need for energy performance guarantees	link to payment of grants and subsidies
lack of requirements for testing (airtightness)	control at delivery of the renovation
little tradition with written contracts for SFH renovation	use new ways to work with performance requirements (EPC, "quality contracts", performance specifications, play/interplay contracts)
inadequate product choice; incorrect use of materials	consult instructions/ product guidelines
lack of regulations for small renovations	propose a technical regulation
Lack of independent advice	
challenge of balancing independency and a total integrated service	use architects and consultants; use a quality label for the adviser or the advice
lack of homeowner's trust towards non-independent actors	provide better, integrated, independent and clear advice; use optional guarantees; monitor real energy use; communicate qualifications
Communication difficulties	
need to emphasize strong points/ difference with other companies	establish (energy) requirements from the beginning
lack of good communication with the client	help the homeowner to formulate requirements
clients have more interest in non-energy related issues	adjust energy advice to the personal life situation of the homeowner
owner can ask for lower ambition level	generate enthusiasm for gain of comfort, increase of value and image, grants as a "must-have"
lack of information to the client	provide simple and tailored information; "instruct" the homeowner; develop ways to easily communicate with homeowners
partners do not share enthusiasm/ (concept) knowledge	communicate with partners

Table 5 Market barriers and opportunities as observed from leading supply-side actors in collaboration structures for nZEB SFH renovation in five European countries

Experiences from collaborating supply-side frontrunners for the realisation of nZEB SFH renovation	
<i>Detected barriers (market related)</i>	<i>Detected opportunities (market related)</i>
Inadequate pricing model	
ability to communicate added value instead of added costs	capture the homeowners' needs, requirements and priorities
homeowners are not ready to pay for planning/ project management	consulting has to be low-cost
pricing model should not be related to project cost	link to energy performance/ monitoring data
homeowner's perception of cost of energy saving measures/ budgetary constraints/requirements of the homeowner	change to step-by-step system for renovation; meet the homeowner; display the homeowner's personal profit
approach including sustainable measures makes the company too expensive	use lean construction methods
fear of the homeowner towards long payback time	put emphasis on life cycle costs
insufficient policy support for energy saving	organize proper support to those who really aim to run at the front to achieve better solutions
Unfamiliarity with collaboration	
challenges in the understanding of the working methods of different trades	organize knowledge transfer related to the trade-spanning interfaces; use morphological design methods; organize actions that promote collaboration
lack of clarity about supply chain integration	collaboration should have no secrets from each other; use concurrent engineering; renovation store should be developed further
coordination between different actors is a challenge	provide additional learning regarding renovation processes
need for control to enter a collaboration	
fear of loss of cooperation with other actors	
actors have different lengths of periods of warranty	
companies are not familiar with cooperating	
limited capacity among the partners	
Competition in the market	
competition with unserious actors	gain confidence and trust as local actor
projects including social sustainability difficult to sell	think customer-oriented
prejudices regarding new ways of construction	
growing competition between companies	
many homeowners contact contractor directly	
lack of awareness of the customer segment/ market potential	
small market observed	
Small company size	
small size of the own company means less competencies	collaborate with other companies, for example in construction teams
small size of the company does not allow big marketing	develop a network of interested companies, professionals and experts
limited space for showing solutions	
process per homeowner is less interesting	

6.2 Conclusion and outlook

The research showed that the supply side for SFH renovation is suffering from a severe image problem of lack of knowledge, inefficient construction processes, insufficient quality assurance and communication difficulties with homeowners. Homeowners further expect independent advice and tailored pricing. While collaboration between supply-side actors is seen as a part of the solution to increase competitiveness, many SMEs are still largely unfamiliar with collaboration. The research showed that as the complexity of integrated renovation services increases, a shift in collaboration structures can be expected, likely towards quality assurance³¹ and performance contracting³².

Frontrunners have found opportunities to eliminate barriers for business collaboration in the nZEB SFH renovation market, such as discussed in the previous section. These opportunities can be considered as 'guidelines' for actors who want to develop a way to collaborative business development for nZEB SFH renovation. Various frontrunners offer integrated quality solutions that are unburdening.

The various cases from the five countries³³ are quite different and at this stage there are no clear indications that one collaboration structure might be more successful than another in the volume market of SFH nZEB renovation. It seems that different models may function satisfactory, but at this stage all of the presented cases are still at an early phase in their development. Apparently the market for nZEB SFH renovation is just emerging, and the existing collaboration structures are not yet able to demonstrate "successful" long-term collaboration apart from their contribution to exemplary nZEB SFH renovation projects. Many collaborations still have to develop their understanding of the customer segment, their attitude towards value propositions, their customer relations or their knowledge, the efficiency of communication channels or their own resources and competencies.

What is obvious from the overall research is that in all countries new collaboration structures for nZEB SFH renovation are indeed emerging and that various types of actors can collaborate. Several collaboration structures take on a perspective that integrates informing the client, consultancy, execution and/or follow-up. It can be questioned if the integration itself is a success factor, since more 'traditional' and loose collaborations also prevail in a market that is still a niche where engaged homeowners find dedicated contractors. Instead, transparency and effective collaboration - beyond product development towards process innovation, customer intimacy and market development - appear to be key success factors.

Stronger collaboration and trust-building is still needed between 'traditional' partners such as contractors, designers and consultants. Also, collaboration can be expected with new types of actors such as renovation advisors, project managers, ESCO's, renovation stores, One Stop Shops, non-profit organisations and/or specific institutes. In each case, actors that address the nZEB SFH renovation market will benefit from good visibility in portals and supported listings³⁴. Collaboration structures still need to develop sound business models that propose scenarios for customer segments, explore partnerships, develop quality assurance and integrate alternative financing methods. To initiate new collaborations various events are now being organized³⁵ and emerging collaboration structures will be helped with the development of their business model³⁶.

³¹ The aspect of quality assurance will further be examined in a separate COHERENO report.

³² See Chapter 3.

³³ See Chapter 4.

³⁴ A specific COHERENO report will be available on this subject.

³⁵ Ibid.

³⁶ Ibid.

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Appendix: Questionnaire to actors from the supply side

The following provides an overview of the questions that were used to address each collaboration structure (six per country).

Interviews were arranged with a key responsible of a collaboration structure or with various companies involved in the same collaboration structure at the same time.

Interviewees

Questions 1-5 can be filled in in advance before the interview.

1. Date of the interview: ...
2. Name of the interviewer: ...
3. Who is being interviewed?

Name of the collaboration structure:	
Address of the collaboration structure:	
Website of the collaboration structure (if available):	
Name of the companies in the collaboration structure, present during interview	Name of the persons engaged in the collaboration structure, present during interview

4. Please describe why you think this collaboration structure is a frontrunner for nZEB housing renovation?
5. List from your national WP2 mapping (preferably more than one) projects in which the interviewed companies contributed:

Supply side partnership

6. Please describe the companies and other parties that systemically collaborate (further described as 'collaboration structure')

Name company/institute	Website company	Type of activity of this company	Size of the company (persons FTE)	Size of the company (annual turnover)

7. If applicable, which other subcontractors are regularly involved in a renovation? (e.g. heating, insulation, installation of windows, specific quality assurance professionals, etc.)
8. Who is contracting/responsible contact point for the homeowner, e.g. for project management? What is offered in such contract? (e.g. means or performance commitment, guarantees,..)
9. Can you briefly describe how coordination of activities among the partners in the renovation takes place? For example, how do you set the same goals? How is information shared? How are decisions made?

Key activities and resources

10. Please describe the specific activities of the collaboration structure regarding nZEB housing renovation and indicate which partner contributes for which activity

<i>Process phase</i>	<i>Contribution of the collaboration in this phase? Which partner?</i>
Informing the owner (e.g. brochures, website, building fairs,..)	
Diagnosis of the project and advising the owner (e.g. energy consultancy, financial advice,..)	
Designing and planning the project	
Executing the project	
Handover of the project	
Post-occupancy follow-up (e.g. monitoring, maintenance contract, use guide, quality assurance,..)	

11. Please describe for which activities which partners receive payment from the homeowner and at what time in the process

Name company	Information phase	Diagnosis/ consultancy phase	Design/ planning phase	Execution phase	Hand over and post-use phase

12. Please describe how the partners contribute to the collaboration structure, regarding human resources, capital, intellectual resources and physical assets.

Name company	Human resources in collaboration (e.g. number of FTE experienced professionals)	Capital/ investment in collaboration (e.g. cash, credits, stock, revolving fund,..)	Intellectual resources in collaboration (e.g. brands, patents, client databases,..)	Physical assets in collaboration (production facilities, buildings, distribution network, communication platform,..)

Approach towards customers

13. Does the collaboration have a specific customer segment(s) for nZEB home renovation? Please describe the segment and its particular needs, why this segment is chosen, as well as how the collaboration identifies this segment.
14. Why does the company think that a homeowner would choose this collaboration structure? E.g. what are the main promoted customer values?
15. How do customers currently find the collaboration structure? (How are the collaboration structures listed, recommended or referred to by third party communication channels?)
16. How does the collaboration structure define nZEB home renovation? (e.g compared to standards, energy performance certification,..) Are there clear targets/aspired results communicated to the homeowner for renovating the house in terms of energy?
17. If applicable, describe how the collaboration structure incorporates energy performance guarantees.
18. If applicable, describe how the collaboration structure incorporates sustainability issues in the marketing.
19. If applicable, how does the collaboration structure promote comfort and unburdening of the homeowner?
20. If applicable, describe how the collaboration structure offers guaranteed timing of the home renovation.

21. How does the collaboration structure help with the owner-occupant with the financing of renovation works?
22. Are there any risk management procedures in place? (e.g. visual on-site inspections, thermography, blower-door including remediation of the detected flaws e.g. air leakage, automated energy consumption registration, project management warning system,...)
23. How does the collaboration structure engage in, or follow specific training activities to develop its offer towards customers?

Further there were some specific questions on quality assurance issues. The interviewee(s) filled in the Tables A and B during the interview. Afterwards, interviewers went to question 24.

Questions on quality assurance and customer confidence

to be filled in by front runners (both in workshop and during face-to-face interviews)

This forms contains some questions on quality assurance and factors creating customer confidence with respect to **ENERGY SAVING RENOVATION** (nZEB, passive or low energy housing renovation) of **SINGLE FAMILY HOUSES**. Please fill in this form and give it back to the organizers of the workshop/the person that is interviewing you.

Please specify your country: ...

Please specify your name: ...

Please indicate which type of actor you are (tick what is appropriate):

- I am a general contractor
- I am a project manager, working independent from other actors
- I am a contractor for wall renovation (exterior walls)
- I am a contractor for roof renovation
- I am a contractor for floor renovation
- I am a contractor for window replacement
- I am a contractor performing thermal insulation works
- I am a Building services contractor (heating, ventilation, plumbing)
- I am an architect
- I am an interior architect
- I am an energy expert/advisor
- I am an engineer
- I am a building cost expert
- I am another party, namely: ...

APPENDIX TABLE A - What often goes less well during the renovation works?

What often goes less well during nZEB, passive or low energy housing renovation and afterwards? And how can we avoid what goes less well? In other words: what could you do in your daily practice, what tactics, instruments, tools, techniques could you use to prevent or remediate these problems?

Please **tick in the table below** (put an “X” in the table below) in the box for each aspect of the renovation process that to your opinion **often goes less well during a renovation process**.

Step of the process	Aspects	What often goes less well? (mark with “X” in the column below in case this aspect often goes less well)	For those aspects marked by you with an X, please specify in the column below what could be done to avoid this? (Please write in column below)
Diagnosis / Analysis	1. Lack of sound independent energy advice as a starting point for planning renovation works		
Design / Planning	2. Flaws in the concept/plan of the architect and/or the plan. Targets were badly translated into technical specifications		
	3. Insufficient knowledge with the architect/advisors on practical issues hindering executing measures as prescribed by them		
Execution of works	4. Inadequate product choice, not according to instructions or product guidelines		
	5. Poor on-site execution, not according to instructions or product guidelines		
	6. Lack of on-site coordination and cooperation between various parties involved		
	7. Lack of on-site quality inspection and control for individual components aimed at detecting flaws (visual inspection, thermography, etc.)		
	8. Lack of control of overall results (thermography, blower door, (thermography, blower door, hydraulic alignment etc.)		

Step of the process	Aspects	What often goes less well? (mark with "X" in the column below in case this aspect often goes less well)	For those aspects marked by you with an X, please specify in the column below what could be done to avoid this? (Please write in column below)
Hand-over	9. Lack of final quality controls		
	10. Lack of delivery of instructions to home owner (user-friendly manual with instruction for operating services systems and for maintaining building and services components)		
	11. Lack of a monitoring schedule of the performance of various components (energy consumption,...)		
	12. Lack of a maintenance protocol/plan handed over to the owner at the delivery of the house?		
Use phase	13. Lack of monitoring of actual energy consumption after the renovation.		
	14. Lack of timely maintenance and replacement of building and services components.		
Other	15. Please specify in case other aspects often go wrong during renovation processes:

APPENDIX TABLE B - What do you already do currently today related to assuring quality of renovation works? And what would you consider to do in order to improve your business in this respect?

Please indicate in the table below, by **ticking** in the respective columns (put an “X” in the table below):

- The elements you **currently already use** in your daily practice;
- The elements that **you consider introducing** for improving your business and for increasing the confidence customers may have in you as a skilled professional;
- The elements towards which you are more neutral (cannot decide/ do not have an opinion).

	Elements I already currently use in my daily practice (mark with “X” in the column below)	Elements that I consider introducing to improve my business (mark with “X” in the column below)	I don’t have an opinion, I don’t know (mark with “X” in the column below)
Your skills, knowledge, expertise			
1. Learn more about renovation processes through handbooks, guidelines, guidebooks			
2. Follow additional training programs and courses about (energy/comfort upgrade) renovations			
3. Gaining new actual on-site experience with renovation works (aspects/ methods you haven’t used before)			
4. Try to increase quality of works by complying/following an independent guidelines/codes of good practice			
5. In order to increase my credibility, I seek third-party endorsement e.g. try to put my name on an independent list of recommended actors			
6. Work according to a quality label/ I will comply with a certification schemes for actors			
7. Other (please specify):	
Quality of the products used on site (e.g. building materials, services systems)			
8. The products I use on site are endorsed by a third-party e.g. list of recommended products for renovation			
9. The products I use have a quality label			
10. Other (please specify):	
Guaranteeing the renovation will lead to the aspired end result (energy savings, comfort upgrade)			
11. An energy advice/ comfort assessment/ general assessment of the house is performed according to a standard procedure/code of good practice (before renovation works)			
12. This energy advice/ assessment is performed by a third-party endorsed			

	Elements I already currently use in my daily practice (mark with "X" in the column below)	Elements that I consider introducing to my business (mark with "X" in the column below)	I don't have an opinion, I don't know (mark with "X" in the column below)
advisor e.g. through a list of recognized experts			
13. The advisor or the advice complies with a quality label			
14. Once it was decided what measures had to be taken, all actors involved in the renovation process are properly informed and all actors agree to deliver the aspired end result			
15. In order to guarantee my client that the energy/comfort upgrade will be achieved I ensure the renovation complies with a quality label/certification scheme (e.g. passive house standard,...)			
16. In order to guarantee my client that the energy/comfort upgrade will be achieved, I sign a contract between the client and myself that specified the energy performance level after renovation (and/or other specific performance criteria)			
17. Please specify any other aspects to guarantee that the aspired end result will be reached :	
A proper renovation process where all parties perform their role			
18. I use protocols, checklists, self-assessment instruments that make sure I follow the proper steps and perform the proper check-ups during renovation works			
19. I make sure a quality surveyor/coordinator is appointed in charge of coordination and risk management on site			
20. Please specify any other aspects that ensure that all actors are properly working together:	
Adequate follow-up after completion of the renovation works			
21. I deliver a user guide to the home owner with clear maintenance guidelines and instructions that allows him to know how to maintain his house.			
22. I make sure monitoring of actual energy consumption after completion will take place at a regular basis (by means of a monitoring contract)			
23. I try to convince the home owner to sign a maintenance contract			
24. Please specify any other aspects that would give you confidence that everything is in place for proper maintenance and follow up after completion of the renovation works	

Roundup

24. To summarize, what do you think are the current strengths/ opportunities of your collaboration structure?
25. What do you think are the current weaknesses/ threats of your collaboration structure?
26. What are your plans to overcome current weaknesses/ threats? For example, what elements will you include in order to improve the quality of your method of working? And to increase the confidence of customers?
27. Is your collaboration structure interested in further collaboration with COHERENO partners?
 - a. Does the collaboration want to propose its offer in business collaborative events?
 - b. Does the collaboration structure want to revise its business model with the help of COHERENO partners?
28. In case you want to be contacted or informed about the results, please mention your contact details here. These will not be disclosed and are treated according to privacy laws.

Name:

e-mail:

telephone number:

Thank you for your time. We wish you a fruitful collaboration.



The sole responsibility for the content and analysis of this questionnaire lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.