SUPPLY-SIDE COLLABORATION FOR ENERGY-EFFICIENT RENOVATIONS

Keywords: Business model, collaboration, nearly zero energy building (nZEB), renovation, supply-side

Abstract

The supply side for nearly zero energy building (nZEB) renovation of owner-occupied single-family houses in Europe is suffering from a severe image problem of lack of knowledge and trust, inefficient construction processes, insufficient quality assurance and communication difficulties with home-owners. Research was done in Austria, Belgium, Germany, the Netherlands and Norway as part of an Intelligent Energy Europe project, entitled "COHERENO - Collaboration for housing nearly zero-energy renovation" to understand the emergence of collaboration structures for nearly zero energy building (nZEB) renovation of owner-occupied single-family houses. The business model of Osterwalder and Pigneur (2010) is used as a reference of the project. Used research methodologies include desk research, explorative semi-structured interviews and focus groups. Based on this, barriers and opportunities for collaboration and business model development in this market segment were detected. Important barriers on the supply side are a 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. On the demand side, there is a lack of confidence in professionals' experience. Home-owners expect independent advice and tailored pricing. Some of the home-owners expect one actor to take the lead and be the 'reassuring' contact point. The way how to collaborate was addressed in the second part of the COHERENO project by organising Business Collaboration Events and action research on business modelling of cooperation structures in the different countries.

1. Introduction

The European Union identified the need of reducing carbon emissions in residential sectors by 88-91% in 2050 compared to 1990 levels, to transform the current economy into a competitive low carbon one (EU, 2011). Europe's new buildings and major renovations will be required to reach the level of "nearly zero-energy" (EU, 2010). For this immense transformation the mind-sets of clients asking for renovation solutions and suppliers offering these have to be changed. The existing housing stock in Europe is predominantly of poor energy performance and consequently in need of renovation work. However, only about 1.2 per cent of Europe's buildings are renovated each year and it is unlikely that this 1.2 percent is renovated to the highest standards of energy efficiency (BPIE, 2011; Tofield and Ingham, 2012). Although more and more households implement single energy saving measures and renewable energy systems (PV-panels), to remain competitive with future new-build houses, house renovations need to go beyond implementing single energy saving measures and should be integrated major renovations or deep retrofitting (Haavik et al., 2012). This makes the market potential for especially privately owned single-family homes 'nearly zero-energy' (*nZEB* in the remaining text of this paper) renovation In Europe is very big Renovations are often constrained by financial and market barriers.

However, the supply side for nZEB renovation of owner-occupied single-family houses in Europe is suffering from a severe image problem of lack of knowledge and trust, inefficient construction processes, insufficient quality assurance and communication difficulties with home-owners. Generally it is assumed that lower costs, lower burden for the client, limiting renovation time and guaranteed energy performance are preconditions for a volume uptake of nearly zero-energy renovation in the privately owned housing sector in Europe (Mlecnik et al., 2013). But, more is needed to build fruitful business models.

The main objective of the Intelligent Energy Europe project entitled "COHERENO - Collaboration for housing nearly zero-energy renovation" (www.cohereno.eu) is to strengthen the collaboration of enterprises in innovative business schemes for realizing nZEB renovation in owner occupied single-family homes (SHF). To support this general goal, explanatory 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 and to find key barriers and opportunities for stepping into collaboration for nZEB renovations. A basic assumption of COHERENO is that 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/contractors) and quality assuring actors (to gain customer confidence).

The way how to collaborate was addressed in the second part of the COHERENO project by organising Business Collaboration Events and action research on business modelling of cooperation structures in the different countries.

2. Research Methodology

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 and offer a one-stop-shop solution for energy-efficient renovation of private owned homes? This main question was explored with three questions in five partner countries:

1. What are new insights from (emerging) national developments and on-going initiatives related to collaboration in the construction sector?

2. What are current experiences of supply-side frontrunners in the nZEB SFH renovation market?
3. What are the main problems and solutions to step into (collaboration for) the market of nZEB housing renovation?

Those three questions were approached with various research methods. To answer the first 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 initiatives and developments. The partners investigated national energy and innovation policy development in their countries related to collaboration in the construction sector, particularly for nZEB SFH renovation. We will illustrate the national developments and initiatives with examples from the Netherlands.
To answer the second question each COHERENO partner interviewed supply-side frontrunners in his/her country. To structure the interviews, 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 a volume market development.

These key items stem from theories of business modelling (Osterwalder & Pigneur, 2010), which is also used as a general guiding theory for the whole COHERENO project. See Figure 1. The model defines customer segments as different groups of people or organizations that an enterprise aims to reach and serve. Value propositions are the bundle of products and services that create value for a specific customer segment. Channels are the means how a company communicates with and reaches its customer segments to deliver a value proposition and customer relationships are types of relationships a company establishes with specific customer segments. Key activities and key resources are respectively the most important activities the company has to perform and the assets of the company (physical, financial, knowledge, human) so that the business model works. Key partners is the needed network of suppliers and partners.

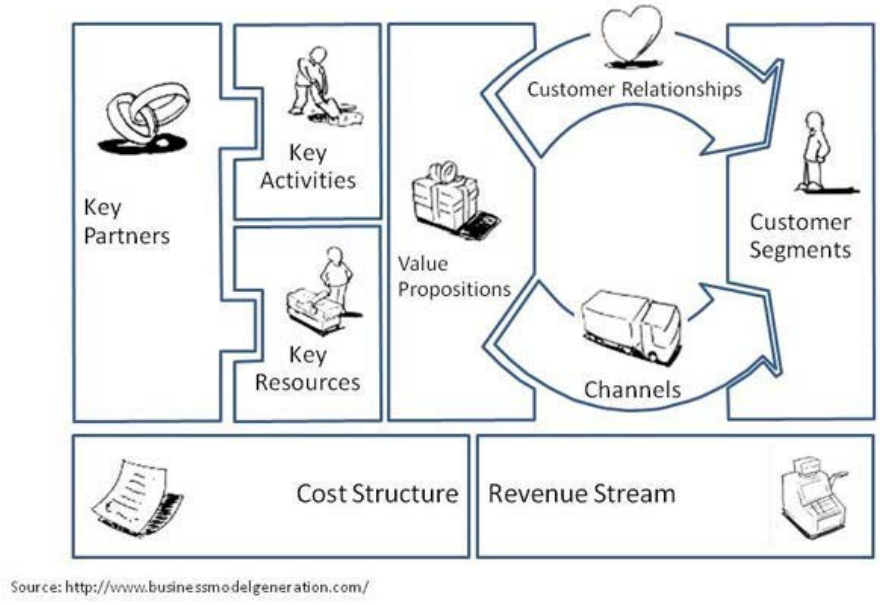

Figure 1 Business model canvas. Source: Osterwalder & Pigneur (2010).

To answer the third question COHERENO partners organized a focus group with frontrunners in their country. External presenters from the supply-side showed inspiring national examples about successful nZEB SFH realizations and/or collaboration for realizing a nZEB SFH renovation. The COHERENO country partners then divided the participants into smaller groups and moderated an interactive group session per group. Questions addressed in each group were what goes less well during nZEB SFH renovation, especially regarding collaboration between the involved actors, and how can we avoid this. The discussions were facilitated using a poster. This poster shows general issues of concern related to five building phases (diagnosis & analysis, design & planning, execution of works, hand-over, use phase). 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. Next the participants were 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. The discussion in this part also led to the experienced top three problems and solutions regarding customer confidence and quality assurance. After the reflections in the separate groups, exchange of experiences of the groups was organized. The workshop was rounded up by an external observer.

Figure 2 Poster on customer confidence and quality assurance. Source COHERENO.

Research Findings

All countries are concerned with the issue on how to restructure the collaboration between companies in order to reach home-owners 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.

Lead actors

The experiences in the partner countries illustrate that lead actors that organize their collaboration for the nZEB SFH renovation market can be general contractors, turnkey suppliers and project managers. It was found that also architects and planning offices, energy advisors, and renovation and hardware stores organize structures for nZEB SFH renovation. Various national, regional and municipal public and/or private initiatives 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 contractors that provide components or services, general contractors, installers, architects and planning offices and independent consultants. Some lead actors have found collaboration with more unusual partners such as banks, renovation brokers, marketing companies or specific suppliers. Furthermore, some structures have agreements with policy makers, or e.g. a non-profit organization to guarantee a high quality standard. Remarkable is also that some collaboration structures engage experienced home-owners in their collaboration structure as a marketing instrument.

Development and initiatives in the Netherlands

'More with Less' (in Dutch: 'Meer met Minder (MmM)) is a covenant signed by the Dutch central government, building sector organisations and the umbrella organisation of housing associations Aedes to create a market for energy efficiency in buildings (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 the same step-by-step plan. In 2014 MmM implemented a qualification scheme for the tradespeople/firms. This scheme holds also an assessment by clients. Approved 'Meer met Minder' suppliers market themselves as energy saving specialists. However, MmM is not directed at whole house renovation but especially the implementation of single measures. Collaboration to advise and carry out integrated solutions is not really the objective.

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’ (In Dutch: ‘EnergieSprong’). 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 housing associations and private home-owners. One of the programs is called ‘Stroomversnelling’ 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 (Van Renssen, 2014).

Another program involved a competition to open renovation stores that can offer integral solutions to private home-owners. Seven stores across the country were opened in June 2014. Straub found that renovation stores differ a lot in customer segments, value propositions and service delivery, and their formalised or non-formalised relationships with supply-side professionals: building product and energy system suppliers, contractors, installers, energy consultants, etc. (Straub, 2014). The stores may combine consulting, informing, contracting and quality assurance services. Part of the renovation stores are founded as legally independent new organisations, others are related to e.g. general contractors. Part of the renovation stores are selling in the first place stand-alone energy efficiency measures and preferably taking them within the mainstream building work. However, implementing single energy saving measures makes a nZEB renovation of homes insure. Home-owners tend to start to make their house energy efficient without having the desired end result in mind. That may cause disinvestments. A clear end result and an outlined phased approach is needed, because not all home-owners are willing and able to invest in a major renovation as a one-of integrated concept. Renovation stores should provide such outlined phased approached, should work preferably independent from building products and energy systems providers, and should guarantee a common understanding on the aspired result and a collaborative and coordinated renovation process. A prerequisite is a secure selection of supply-side professionals to work with.

Barriers for collaboration

Both contracting and consulting actors highlight in the interviews in all countries 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. 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 home-owner situation. Consulting actors notice the lack of knowledge of the home-owner and the lack of information to the home-owner. This makes it difficult to convince home-owners to take decisions. We note that various contracting and consulting actors expect the home-owner to be responsible for maintenance or future works.

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 companies that could be seen as bunglers in construction work. 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. They also see bunglers in this market as threats, companies bound by product suppliers offering free energy consultancy services to home-owners. This contradicts with the wish of clients for independent advice. Moreover, owners can contact a contractor directly without energy consultation before. Generally, home-owners are more interested in non-energy related issues than energy saving, and even can ask for lower ambition levels. According to the interviewees, home-owners show prejudices towards new ways of construction. Consulting actors are also confronted with home-owners that are not willing 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 home-owners. Consulting actors express a fear of the home-owner towards long payback times 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.

The main issue for all actors is a lack of trust of the home-owner 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.

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.

Similar barriers reappeared during the national workshops with frontrunners. 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.

Opportunities for collaboration

The national workshops provided many ideas from various countries how detected barriers could be eliminated. See table 1. Due to their limited competencies, knowledge or resources small companies do not really have an alternative but to collaborate with other actors. They can built partner trust in loose collaborations – for example engaging in concurrent engineering or morphological design sessions - before stepping into formal collaborations. In any case they should make use of networks of interested companies, professionals and experts to position themselves in this market segment.

It is in practice difficult to balance independence and offering a total integrated solution and service. However, the home-owner only tends to trust independent advice. Independent knowledge can be found by collaborating with competence networks and by involving independent, experienced and 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 home-owner and to think in customer-oriented packages. The home-owner should be engaged in all information transfer to keep enthusiasm. Communication should run smoothly and knowledge between all involved actors should continuously transferred across disciplines. Education of actors is probably best organized on site or by using existing education initiatives.

It is important to have a single trusted contact point for the home-owner; it can be recommended that this person fulfils specified goals (energy performance, timing, information transfer) and manages and coordinates the process. In any 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 home-owners with financing difficulties, collaboration structures can address opportunities to show the costs and benefits of a step-by-step renovation and by offering administrative unburdening to apply for loans, grants and so on. In communication the added values (also non-energy benefits) and life cycle cost could be emphasized.

Table 1 Market barriers and opportunities as observed from frontrunners in collaborative structures for nZEB renovation (COHERENO, 2014; adapted)

Barriers	Opportunities
Home-owners are not willing to pay for consultation, planning and project management	Offer low-cost services and/or services for free if renovation decision is made
Budgetary constraint home-owners	Offer step-by-step renovation
Perception of costs and benefits of energy saving measures	Display the home-owner's personal profit
Unfamiliarity with collaboration	Organise knowledge-transfer related to interfaces of involved trades
	Use morphological design methods
	Develop a network of (local) interested companies and professionals
Limited capacity among the partners	Collaborate in construction teams
Competition with bunglers	Gain confidence and trust as local actor
	Think customer-oriented
	Make agreements with local policy makers
	Involve financial actors and quality assurance actors in the collaborative structure
	Use (reviews) of experience home-owners in marketing

Discussion

The various examples from the five countries 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 collaborative structures 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.

Obviously,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 home-owners 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 project managers, Energy Service Companies, renovation stores and hardware stores, product suppliers and non-profit organisations.

Conclusion and Further Research

The experiences in the various countries are very different. 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 Shops and customer web portals, Open House Days and physical renovation stores, is expected to increase.

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 home-owners. Home-owners 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 assurance and performance contracting.

Frontrunners have found opportunities to eliminate barriers for business collaboration in the nZEB SFH renovation market. These opportunities can be considered as 'guidelines' for actors who want to develop a way to collaborative business development for nZEB SFH renovation.

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 between companies requires complementary service portfolios and compatible business cultures. Collaboration with experienced professionals or consultants makes sense to attract the right knowledge and to develop first projects. One actor has to take the lead and act as the 'reassuring' contact point for the home-owner, maintaining a permanent relationship. 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 home-owners can be reduced.

Today's business models in the construction sector are still largely suboptimal and authorities in various countries still need to stimulate the supply-side and the demand-side by various informing and supporting instruments for high ambitions for nZEB SFH renovation. The national and local renovation market circumstances differ a lot between the EU-member states. Despite various exemplary actions, the market for nZEB SFH renovation is still too small. Additional demonstration of projects to home-owners is needed, and experiments and pathways to address the emergence of quality-oriented collaboration structures should be developed further.

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 the existing mass-housing stock in Europe partly can be renovated to nZEB by standardised solutions by larger companies and partly renovated as niche markets depending on the characteristics of the housing stock and client segments by SMEs and voluntary collaborative structures. The collaborative enterprises may evolve into a consortium, defined by Gruneberg and Hughes (2004) as an arrangement between a number of firms in which each firm contributes an equity stake in form of a risk capital or payment in kind in order to qualify as a member. However, this seems not to be a prerequisite. There is limited scientific knowledge about collaboration between small and medium-sized enterprises (SMEs), with other actors and the formation of consortia in the building sector. According to Janda and Parag (2013) low-carbon refurbishment is a new profession and/or jurisdiction, and existing

professional roles may expand to encompass new competencies. Also, new roles and new competencies may be needed (Janda and Parag, 2013). Further research is needed into what these competencies are.

House owners prefer to contact small and medium sized enterprises (SMEs) when renovating or planning to renovate their houses. Carlsson and Koch (2015) claim, based upon a local study of three craftsman contractors and their interaction with house owners as potential customers for renovating their home that conservative renovation actions are the result of both parties acting in a routinized play they cannot easily escape, which creates barriers for applying new green technologies and/or renovations in an energy saving manner. This may mean that contractors have to change this routinized behaviour and should approach the customer in another way or should collaborate with enterprises that sell the renovation to the customers. Further research has to done in relationship marketing, customer journeys and customer intimacy in the private house renovation market. Treacy and Wiersema (1992) state that companies that excel in in customer intimacy combine detailed customer knowledge with operational flexibility so they can respond quickly to almost any need, from customizing a product to fulfilling special requests. The ability to fulfil special request seems to be crucial in the owner-occupied renovation sector.

Initiatives and projects related to energy efficient renovation in the European construction sector mainly either address dwellings owned by social housing organisations or single-family houses. The nZEB renovation market of apartment buildings with shared ownership is even more difficult to deal with because of the (lack of) awareness of the different owners, different customer segments and needed value proposition, the need to merge the interests of the owners and aligning their customer journeys and often financing obstacles. Collaboration between companies for informing, consulting, contracting and quality assurance is a necessity.

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