Value propositions for business models for nZEB renovation

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Abstract: It is poorly understood what the characteristics are of households who want to engage in nZEB single-family home renovations. This paper addresses the research question: What are customer segments, and what are their customer values and motives to choose for a nZEB renovation of privately-owned single-family dwellings in the Netherlands? Research methods are a literature review, a home-owners questionnaire and home-owners interviews.

In the Netherlands customer segmentation for nZEB renovations currently is not useful because of the limited actual size of the market. One could focus on somewhat older households, high educated and with an income which is on average or above. Characteristics of the dwelling, the energy use, the technical status and inherent comfort levels could be taken as main ingredients for value propositions. Trust in professional involved actors and objective advise are very important issues in customer relationships.

Keywords, nZEB renovation, single-family homes, value propositions, business modelling, energy efficiency

Introduction

The existing housing stock in Europe is predominantly of poor energy performance and consequently in need of renovation work. Nearly zero-energy building (nZEB) has been introduced by the recast of the Energy Performance of Buildings Directive [1], which has set a very general framework and asked the Member States to elaborate their national approaches and implementation plans.

Renovations are often constrained by financial and market barriers. 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 [2]. 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 [3].

However, it is poorly understood what the characteristics are of households who want to engage in nZEB single-family home renovations. What is significant about owner-occupied homes is that those initiating the retrofitting and those living in the house before, during and after the retrofitting are the same people [4]. According to Gram-Hanssen, in most cases, these people do not have specific technical knowledge or an interest in retrofitting. In other words: What are their motives to choose for a nZEB-renovation of their house? Also, it is not
well understood who they are, how they can be reached and what type of relationship with actors that have the specific technical knowledge, they value [4].

This paper is based upon the first results of an ongoing Intelligent Energy Europe project, entitled “COHERENO - Collaboration for housing nearly zero-energy renovation” [5]. The main objective of this project is to strengthen the collaboration of enterprises in innovative business schemes for realizing nZEB renovations of owner occupied single-family homes. The research is performed in five countries: Austria, Belgium, Germany, the Netherlands and Norway, in order to identify regional business modelling issues - particularly customer segmentation and value propositions for suppliers - that can lead to improved collaboration of actors and to identify the need for quality assurance in these countries, in order to increase customer confidence of such home renovations. The paper addresses the following research question: What are customer segments, and what are their customer values and motives to choose for a nZEB renovation of privately-owned single-family dwellings in the Netherlands?

Research methodology
The business model of Osterwalder and Pigneur [6] is used as a reference for the COHERENO project. The right side of this model about value propositions and customer segments is used as the reference for this paper and to set up a home-owners questionnaire. The model defines customer segments as different groups of people or organizations 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 [6].

National studies on the willingness to invest in energy renovation of private home-owners provided insights to define customer segments and value propositions. Furthermore an on-line home-owners questionnaire and three interviews with home-owners, early adopters of nZEB renovations, but not respondents to the questionnaire, gave additional information about value propositions, customer channels and customer relationships for nZEB single-family home renovation. In the development of the questionnaire particular attention went to finding arguments to increase customer confidence by quality assurance.

Willingness to invest in energy renovation by Dutch customer segments
Not renovation but piecemeal adoption of measures is the norm in the private housing sector [7]. As for energy saving measures in owner-occupied housing, not an intrinsic motivation to contribute to environmental quality, but financial arguments are dominant [8,9]. Improvement of comfort is also an important incentive. In a survey by Westeneng and Van Elst [10] 97% of the households mentioned comfort as an important reason for adopting energy saving measures, followed by cost savings (92%). Environment or sustainability is also mentioned as an important reason, but less frequently (67%). Veltman and van Welzen [8] found different (much lower) percentages, but in the same order of preference.
Lack of finance, the disorder caused by the works and uncertainty about the energy savings are frequently mentioned in literature as barriers for investing in energy saving measures. Westeneng et al. [11] found from interviews with households that subjects related to freedom of choice and certainty were frequently mentioned. This ‘certainty’ had much to do with the confidence of customers in the contractor. Home-owners can be uncertain about making a choice between contractors, because they have too little knowledge about their qualities and, related to this, do not know how to select those [11]. This is confirmed by Veltman and Van Welzen 8], who stated that 40% of the owners-occupiers were confronted with contradicting information and that 48% found difficulties in distinguishing reliable form unreliable information.

Murphy [7] found a significant correlation between holding an energy performance certificate and adopting energy saving measures; nevertheless, households purchasing a home with an energy performance certificate did not adopt more energy saving measures that those who purchased their home in the same period without such a certificate. Together with the issue of a certificate, the receiver is advised about several (voluntary) measures that are seen as appropriate in his/her situation according to the assessor. However, 60-70% of the recommendations of the assessors are ignored [7]. Murphy [7] identified the following characteristics of households contributing positively to adopting energy saving measures:

- living in a detached dwelling;
- living in an older dwelling (mainly built before 1971);
- aged between 40 and 65;
- having already adopted some energy saving measures.

The last point is confirmed by Westeneng and Van Elst [10], who found that 82% of the households that have adopted energy saving measures are prepared to take new energy saving measures.

Not surprisingly, the immediate period after the purchase of a home is relatively often chosen for adopting energy saving measures [11]; shortly after this period, households are less willing to invest than on average.

**Customer segments**

The apparently small demand for energy renovations, let alone nZEB renovations, makes a segmentation of the market less relevant and also more difficult to substantiate. Moreover, Westeneng et al. [11] state that individual home-owners are very diverse in their preferences. This obstructs the development of a clear and concise categorisation of consumers; any typology would be not of use because of the heterogeneity within each of the types. Nevertheless, Veltman and Van Welzen [8] have developed, from a survey among home-owners, a classification of three groups, based on commitment to environmental issues. These groups are as follows in Table 1.
Table 1 Customer segments committed to environmental issues

<table>
<thead>
<tr>
<th>Segment name</th>
<th>Sample share</th>
<th>Description</th>
<th>Population characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indifferent</td>
<td>31 %</td>
<td>Uninterested in environmental issues, but do not necessarily have a negative attitude towards sustainability</td>
<td>Mostly younger home-owners, living in relatively affordable housing (mostly flats), low education, modal income</td>
</tr>
<tr>
<td>Positive</td>
<td>45 %</td>
<td>Take a position between the “indifferent” and the “fans” as for attitude towards sustainability</td>
<td>Mostly middle-aged, living in a terraced house</td>
</tr>
<tr>
<td>Fans</td>
<td>24 %</td>
<td>Positive attitude towards sustainability</td>
<td>On average somewhat older home-owners, high education, high income, living in larger and more expensive homes</td>
</tr>
</tbody>
</table>

Source: Veltman and Van Welzen [8].

According to Veltman and van Welzen [8], each of these groups needs a different communication strategy for the adoption of energy saving measures. More information about this can be found in Burghouts et al. [12]. They presented the respondents several ‘propositions’, which did not only include measures, but also means to get these measures realised, for instance by offering a finance scheme or someone who would take care of all the arrangements. Education level, income and age were important factors for not only the willingness to invest in energy saving measures, but also for the choice of the propositions.

Initiated by the Dutch Ministry of the Interior and Kingdom Relations the organization Platform31 carries out the policy programme “Energy Leap” (NL: EnergieSprong) for the built environment. One of the projects called “The Acceleration for the private sector” ((NL: Stroomversnelling) 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 houses’, to be realised in ten working days and an investment of maximum 45.000 Euro (including VAT).

By means of a questionnaire owner-occupants of single-family row houses built between 1950 and 1980 and a monthly energy bill of 175 Euro were asked for their interest in having their house refurbished to an ‘Energy bill = 0 house’, for the price of their current energy bill, based upon a mortgage of 30 years [13]. One third of the respondents are (very) sure that they will accept this offer, one fourth of the respondents will likely accept the offer and one third has doubts. 16% will decline the offer. The researchers conclude that the innovators and early adopters are especially high educated couples, between 35 and 40 years old and with a higher income. Often they live less than 10 years in the current house and they appreciate a new look for it. Asking for drivers and barriers, the most mentioned drivers are value increase of the house, energy savings, a limited renovation process, no energy bill and more comfort. Barriers are the high investment, an extra mortgage and overall for the respondents the lack of clarity and certainty of the offer.
Findings of the home-owners questionnaire and interviews

In previous work of the COHERENO project a so-called nZEB radar was used to define a pool of home-owners that renovated their house [14]. These home-owners were addressed with the demand-side questionnaire.

The households of the Dutch respondents (17) exist for 44% about one or two persons and 66% of three persons and more. None of the households is below 40 years old. 77% is between 40 and 60 years old, meaning that also older households are interested in energy renovations. Their annual income level is above average. The majority of the households financed the renovation with their own savings.

The motives for initiating the renovation were especially to reduce the consumption of energy (indicated by all respondents) and to improve indoor comfort or health conditions. Various physical needs such as needed repairs of building parts and building services were just for a minority important to decide to renovate. To reduce draught from windows and doors, and a more comfortable indoor temperature in winter were the most important indoor comfort and health conditions. Looking to financial reasons saving on the energy bill was an important reason to renovate. Also of some importance were a reasonable payback of the investment and an increase of the property value. Looking to environmental reasons it is clear that the respondents found important a low or minimum energy use, to produce their own energy, to reduce the impact on the environment and to have a healthy indoor environment. One of the interviewees said: “Important motivations for the renovation were using energy as less as possible and to live comfortable. Moisture problems were prominent in the house, effecting the health and comfort. In any way, we had to do anything about those problems”. Another interviewee: “I presume the payback time of the insulation investments less than 10 years. If not, than the market value and the comfort has been increased”.

Respondents to the questionnaire noticed as their biggest challenges in the renovation project and reaching high energy efficiency:

- to evaluate alternative energy-efficiency solutions;
- to make sure that all (new) building systems work proper together;
- to align insulation measures with airtightness of the house;
- and to get guarantees about the energy savings and the renewable energy generation.

Respondents and interviewees point to the fact that often just the standard solutions are in mind of in the nZEB renovation professional involved parties. Interviewees stress the point to experience (new) unknown solutions before a final choice, e.g. a pellet stove. An interviewee said: “Home-owners are not able to choose the right measures, even proposed by professional firms, because the firms are in the first place driven by figures. That different contractors bundled themselves in coalitions gave the needed trust in their approach and their offers”. Another interviewee: “The process till the final offers gave trust in the contractors. They were highly motivated. An extensive energy advise gave trust in reaching the desired end result.” The third interviewee: “Trust of home-owners is based upon keeping to the made
appointments. Home-owners need an independent place to share their experiences with energy renovations”.

The customer channels that were listed the most by Dutch respondents are internet, web pages and e-mail, and the notice of similar projects. Part of the respondents are actively engaged with energy efficiency, working as an architect, adviser or constructor, or working for a governmental organisation promoting energy efficiency.

**Discussion and conclusion**

Obviously energy cost savings and comfort outcomes motivate home-owners for energy-efficient renovations. Organ et al. [15] conclude in their UK-study on motivations for energy refurbishment in owner-occupied housing that the principal reasons are energy bill savings, to increase comfort and to reduce the environmental impact. Whether owner-occupants have a more ‘egocentric’ or ‘altruistic’ attitude influences the strength of these principal motivations. Also the technical status of the dwelling could be a motive to renovate, however less important. Building components that have to be replaced because of technical reasons, could be replaced by energy-efficient ones. Indeed, this matches with the immediate period after the purchase of the house to adopt energy saving measures. This also means a potential for the implementation of energy-efficiency measures within mainstream building work to existing buildings. Wilson et al. [16] propose six conditions which are relevant to the emergence of renovation decisions: conditions ranging from balancing competing commitments to the physicality of living. In respect of energy-efficient renovations they propose to bundle or package energy efficiency measures into amenity renovations. For business modelling this means that appropriate customer channels are e.g. kitchen contractors and not insulation contractors. This approach shows similarities with initiatives in the Netherlands to open local energy savings renovation stores, in some cases as a shop-in-shop, emphasizing energy measures as a normal product to buy for your house next to other products like sun screens and carpets.

As stated before, house renovations need to go beyond implementing single energy saving measures. Taking energy measures within the mainstream building work makes a deep nZEB retrofitting 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 deep retrofitting as a one-of integrated concept.

In the Netherlands customer segmentation for nZEB renovations currently is not useful because of the limited actual size of the market. One could focus on somewhat older households, high educated and with an income which is on average or above. Characteristics of the dwelling, the energy use, the technical status and inherent comfort levels could be taken as main ingredients for value propositions.
Trust in professional involved actors is a very important issue in customer relationships. Trust based upon objective advise, a solid piece of work, intrinsic motivation of professionals in energy savings and the willingness to combine knowledge and experience with other actors. In case of nZEB renovations architects can play an advising role and can communicate with home-owners, as an actor trusted by the home-owners. Clear commitment of the professionals towards energy saving, e.g. expressed in energy saving guarantees, is important.

References
[14] Internationl report “nZEB criteria for typical single-family home renovations in various countries”. www.cohereno.eu/about/project-outcomes.html