GA N° 649865

Final report

Project acronym:	REFURB
Project's coordinator:	Dr Virginia Gómez Oñate (VITO)
E-mail:	virginia.gomezonate@vito.be
Period covered by the report:	from [01/04/2015] to [31/03/2018]

June 2018

www.go-refurb.eu

This project has received funding from the European Union'sHorizon 2020 research and innovation programme under grant agreement **No 649865**

Contents

Introduction – the REFURB Story

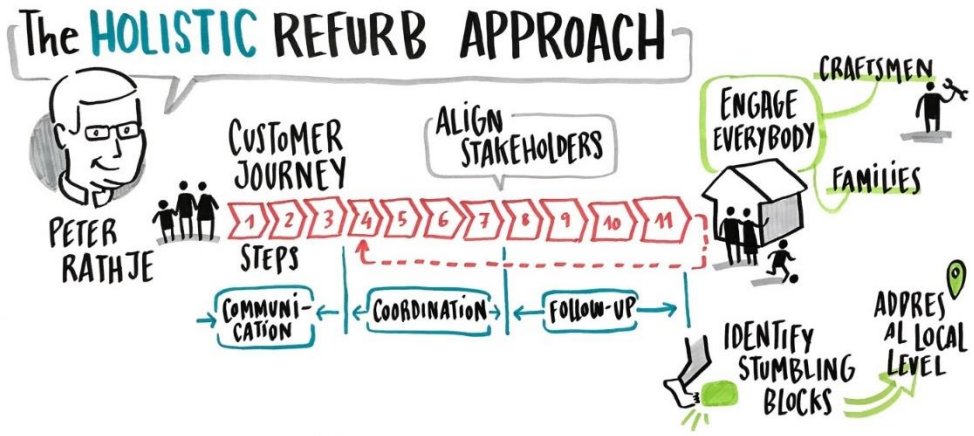
More dwellings will have to be yearly renovated to achieve EU's **energy and climate goals** by 2030 and 2050. The renovation rate must increase and the deep energy renovation must become the standard. These huge challenges are faced in all EU-countries.

Among the most complex is the **private housing sector**, with private homeowners each responsible for taking the right decisions, and providing financing and managing renovation processes for their own dwelling. Not all homeowners have the will, the knowledge or capacities to do so. Moreover the public sector is pushing homeowners to change the demand, while the building sector is not always ready with providing future-proof solutions. And even homeowners willing to go for a deep energy renovation, drop out of the renovation process for many good reasons: a renovation is a complex hassle.

The REFURB-consortium aimed to increase the renovation rate by **bridging the gap between the supply side (building sector) and demand side (homeowners)**. The ambition was to unburden homeowners, make it more easy for them and create one-stop-shops instead of being confronted with a myriad of parties, contractors, public bodies, etc. The consortium developed a methodology and country roadmaps which will result in dedicated renovation packages for different market segments and regions across Europe, starting with the private residential sector (homeowners). **Customizable renovation packages** were developed and tested to ensure that they meet local demands and can be provided by local suppliers.

This new holistic approach is centered around the homeowner-family as the key stakeholder. All must be designed around the decision making and renovation process of the homeowner. A deep energy renovation is a process the homeowner goes through, called "**the customer journey**". During this customer journey, there is a risk to drop out as lots of barriers are faced along the way. Reducing the barriers from a customer point of view will reduce the drop-out and increase the renovation rates. The supply side (building sector) as well as public parties and stakeholders must learn to organise themselves around the customer journey to scale up and improve impact.

Within the succesfull pilots of the REFURB-project, the specific focus was on creating one-stop-shops via un-burdening the homeowner and ensuring that the advice is trustworthy, providing an optimal, customised solution for modular, deep renovation towards NZEBstandards.



Executive Summary

Background

The REFURB project was set up in responce to the important Europe wide challenge of improving energy efficiency in residential buildings, and especially in uptake of major renovation of houses. The main barriers thet REFURB related to are the fragmentation of the renovation process itself. On the supply side each supplier (technology providers, contractors and architects) only delivers a fraction of the renovation work and - in general - does not take responsibility for the overall success of the renovation (i.e. the desired energy reduction level). On the demand side, the main barrier lie not only in financial restrictions to renovation or even general awareness of the potential benefits of renovation, but in the fact that private homeowners do not have a structured way to obtain all the necessary information for decisions on renovation solutions.

As response to the above challenge and main barriers, the REFURB project focused on bridging the gap between the supply side (building construction sector) and demand side (homeowners) by developing dedicated renovation packages for different market segments within the residential sector.

The overall approach was to bring together all relevant stakeholders of the supply and demand sides to a) develope a holistic methodology for the renovation process in which technology combinations trigger step-by-step deep energy renovation of existing, private residential buildings towards NZEB-standards, and b) introduce a "Compelling Offer" (i.e. an offer you can't refuse) to residential homeowners based on a match between available technologies and their concerns. Following this approach, a set of activities focused on:

- Understanding the demand and supply side drivers;
- Understanding the different dynamics of various market segments;
- The development of a robust and compelling offer;
- Wide-spread rollout and transferability.

The REFURB consortium consisted of knowledgeable companies, partnerships, associations and local public authorities, able to mobilise the relevant stakeholders in the respective value chains for buildings renovation packages. It had a well balanced mix of competences and skills and included 13 partners: RTO's/Technology Transfer organisation (VITO – the project Coordinator); construction industry company partners (BOSTOEN and RECTICEL); distribution system operator (FUDURA) deeply involved in the EE building renovation domain; organizational cluster of renovation companies (CLEAN); local, municipal and regional authorities, cooperations and associations (PZ, TREA, LEIEDAL, FRYSLAN, BSC KRANJ, BHL); and finally University and Research organisations (AAU and ISW) whose involvement brought technological and analytical competencies.

This group of project partners were strengthen by the 6 EU participating regions, bringing very large scope of housing types and huge dissemination capabilities with a total of 1,350,000 inhabitants and more than 500,000 homes. The participating regions were: South-West-Flanders; Province of Fryslân, Netherlands; Sonderborg and South Denmark; Tartu, Estonia; Halle, Germany; and Gorensjka region, Slovenia.

Results & Key Findings

A **tailored segmentation of the nZEB house renovation market** was developed, by using: behaviour study, psychology, sociology, economics, technology, legislation, architecture, building physics, urbanism. This

provided an insight into how homeowners decide, plan and think, and in particular, how this could affect their choice to invest (or not) in NZEB home renovation. As a result, six clusters with similar characteristics on the NZEB house renovation market were defined. To avoid having too many combinations within these 6 clusters, a matrix was used as a tool to design tailor-made segments (based on an interplay of dweller and dwelling characteristics,) which resulted in identification of **high-potential market segments in Europe to design nZEB renovation packages for:** "young families", "Post-war suburbs with detached houses", "Empty nesters", "Terraced houses with a high energy bill", "Convinced energy savers", and "Homeowners of multi-apartment dwellings".

REFURB found that these segments face similar drivers or barriers. However, local critical success factors to tackle barriers and activate drivers for housing renovation differ in the REFURB's participating regions. It was observed that **local conditions may play an important role,** through local legislation, the mobility of homeownership, subsidy schemes, acceptance of renewable energy, building sector readiness for NZEB, the tradition of staged renovations.

The REFURB project also made an in-depth analysis of **10 existing demand aggregation schemes** based on best practice experiences. Focus was given to analyse their **success factors, fail factors, and how to reduce the drop-out moments** of homeowners. Based on the analysis findings, a set of recommendations on the best way to organize the demand side was provided.

How the homeowners should be approached with the information they need to make them able to make a decision and to encourage them to invest in NZEB-renovations, was also investigated. The **customer journey model** was found as most suitable. Based on the findings of the critical success and critical fail factors in the Customer Journey the REFURB partners formulated recommendations for continuous improvement of the Customer Journey towards nZEB. REFURB confirmed that the main barriers in the residential sector relate to fragmentation of the renovation offer, resulting in inefficient or only partial solutions. In addition to financial restrictions and unclear benefits, homeowners do not have a structured way to obtain all the necessary information.

REFURB also analysed what is driving homeowners to renovate their home to NZEB, in the eyes of the supply side. Both drivers and barriers were researched. This resulted in a list of categories of demand-side drivers and barriers. **It was found that the supply sides' perception of the drivers of the demand side is very approximate to the real drivers of the demand side**.

By looking at the state of the renovation market and listing the solutions for renovation to NZEB that are (near-)available on the market, REFURB project formulated recommendations to which existing renovation solutions can be used in **renovation packages** that are offered to homeowners to stimulate them to renovate their house to NZEB. The so called One-stop-shop concepts for home renovations were analyzed. Out of the examples of one-stop-shop concepts analysed in Europe, the **common characteristics of existing one-stop-shop-solutions** were identified. It was clear that the specific country context determined the success of the one-stop-shop solutions. Furthermore, many of the analysed one-stop-shop-solutions are not isolated initiatives. Most of them are embedded in a much broader programme, project or campaign, with clear demonstration projects, etc.

Further step towards the REFURB aim was through investigation on the suitable financing constructions specific for energy efficient house renovations. It was found that there are number of financial stimuli to reward homeowners when they conduct nZEB renovation. This can be **coaching, grants and subsidies** for individual energy-efficiency related renovation measures of the building envelope or the technical

installations, or **tax stimuli** such as tax deduction for selected renovation measures or tax reduction on a property in case of achieving a certain energy efficiency level with the renovation.

REFURB Main Outcome

The main outcome of the REFURB project is in:

- **Defining compelling offers for integrated nZEB house renovation**.
- Developed **methodology, the toolbox and a template for creating compelling offers**, and
- **Database of 10 country specific and market/ownership segment** related compelling offers for BE, DK, DE, NL, SI and EE.

An overview of the **REFURB country-specific compelling offers**:

	BE	DK	NL	DE	EE	SI
	ALL-IN-ONE AND STEP-BY-STEP RENOVATION PACKAGES	FIVE PACKAGES FOR COMFORT AND HEALTH	UNBURDENED NZEB RENOVATION	ATTRACTIVE FLATS TO LET OUT	A FAIR NZEB OFFER	AN ECONOMIC SAFE SOLUTION
Target group	Single family houses	Single family houses	Any private owned house	Multi-apartment, Housing companies and cooperatives	Multi-apartment, private owned	Multi-apartment, private owned
Construction period	Any	1960-1980	Any	Any	1960-1980	Any
Specific intervention timing strategy	Yes	Time of purchase, time of retirement	Yes	When there is a need	When owners can agree	When owners can agree
Single point of contact, independent energy adviser	Yes	Yes	No	Non Applicable	Non Applicable	Non Applicable
Financial offer	No	Can be integrated locally	ESCO	KfW funding options	KredEx Package	ECO Fund
Investments in EUR	60.000+	12.000-67.000	20.000-100.000	No limits	55.000-394.000	No limits
Webpage with calculation tool	Yes	No	Non Applicable	Yes	No	No
Energy ambassadors	Yes	Yes	Yes	No	No	No
Customer Journey consortium	Industry with energy expert and architects	Regional/local stakeholders	Local community	District solutions	Local community	Construction company driven
Quality assurance issues addressed	Yes	Non Applicable	Yes	Online tool	Yes	Yes

Within the REFURB project a **tool 'My Energy Compass'** was developed. REFURB developed an online tool and approach to ensure market uptake of renovation packages. The partner Leiedal created the tool 'My Energy Compass'. The tool is tailor-made for Leiedal's region, but the concept and design can inspire similar

tools in other regions in Europe. The key concept behind the design of the tool is the model of the customer journey to renovation. 'My Energy Compass' is designed to convince homeowners to start with their customer journey to renovate their house and to nudge them to the other steps in the customer journey.

Moreover, it was found that **performance guarantees are neither a trigger for homeowners to complete their nZEB renovation nor a major barrier in entering the customer journey.** However, this does not mean that quality issues should be neglected or that actions should not be put in place in order to achieve the expected energy savings. It is rather an appeal for a **holistic quality approach:** the entire customer journey should have quality checks built in.

REFURB also found out that **quality assurance can be embedded in different ways in the compelling offers for NZEB renovation services.** This is done in a way to complement performance guarantees of energy savings (as the prerequisite for customer-confidence), to improve the customer relationship by providing guidance along the entire customer journey (CJ). The renovation process is based on a trust relationship between the consumer and the supply side**. In one-stop-shops, the Single Point of Contact builds a trust relationship with the customer during the complete customer journey.** The main challenge is to create customer confidence to get homeowners on board throughout the entire (11 steps) of a customer journey towards nZEB home renovation.

In order to facilitate widespread application of the project's solutions, it is important to first test the solution within the regions of the project partners. Therefore, each participating country carried out a **pilot test in collaboration with regional partners** to create, test and improve the compelling offers for deep energy renovation for their target segment(s). The regions selected focus groups of local stakeholders (including homeowners) to participate in the pilot. Insights and lessons learned gathered during the focus groups were used to optimize the compelling offers accordingly.

A **roll-out plan** was composed that describes how widespread uptake of the solution developed in REFURB can be implemented in other regions and cities. The plan focussed on private homeowners throughout Europe and describes concrete actions that have to be taken-up.

Wide EU Outreach

REFURB's ongoing work and results were presented at a number of international workshops, field studies with visits to renovation of buildings were organised, and local workshops and networking activities took place. A highlight dissemination action was the REFURB's final conference held in October 10th 2017 in Brussels, in coordination with Renovate Europe Day 2017 during European week of Regions and Cities. The consortium invited partners and high-level policy makers.

1 REFURB Cooperating EU regions and partners

REFURB was a consortium of 13 partners and a number of co-operators in a project exceeding borders in EU. The REFURB approach entailed first local tailoring then replication to other regions/sectors.

Figure 1 Cooperating regions

1.1 SOUTH-WEST-FLANDERS, BELGIUM

South-West-Flanders is a group of 13 cities and municipalities, accounting for about 300.000 inhabitants. Leiedal groups them as an inter-municipal organisation for regional development (the region is not a legal body as such). The region has the ambition to become climate neutral by 2050. The acceleration of the renovation rate of the private housing sector is a cornerstone of this policy, as it will reduce the regional energy cost of homeowners, increase the investments, and reduce the risk on energy poverty.

1.1.1 VITO[1]

vito
vision on technology

Vito is a leading European independent research and consultancy centre in the areas of clean technologies and sustainable development, elaborating solutions for the large societal challenges of today. The sustainable living and building team at VITO aims to facilitate the transition to a sustainable built-up environment. VITO has been and is involved in numerous local, national and EU projects on the topic and has an established reputation in this research field as a research and coordinating partner.

VITO was the project coordinator of Refurb.

[1] www.vito.be

1.1.2 Leiedal[2]

Leiedal as an inter-municipal organization tat supports the broad socio-economic and spatial development of the 13 municipalities. Its principal activities are the development of business parks, urban planning, housing, e-government, sustainable energy planning, sustainability and environment, mobility, regional networking, cross-border and European collaboration. Leiedal cooperates with the 13 cities and municipalities and regional stakeholders (housing sector, welfare sector, energy sector, building sector...) in a regional renovation program, called "Warmer Wonen" (In English ”Warmer Living”).

Leiedal was the WP2 leader related to the demand analysis and developed one specific compelling offer and the Refurb tool, ”My Energy Compass”. The tool and the compelling offer were brought to the market during the project.

1.1.3 Bostoen[3]

Bostoen is a well experienced contractor specialised in certified and afordable passive construction. Relaying on its market knowledge and 40 years of expertise, Bostoen created in 2013 a renovation department for existing buildings. Bostoen has built more than 450 passive houses of which 300 have already been certified. The majority of these homes fits within a total budget of 300,000 euros for house & land included. All the passive, zero energy and nZEB knowledge will be transferred into renovation process.

Bostoen was the WP3 leader analysing the supply side. They developed a specific compelling offer from the supply point of view. Bostoen decided to stop with nZEB renovation during the Refurb project.

1.1.4 Recticel[4]

[2] www.leiedal.be
[3] www.bostoen.be
[4] www.recticelinsulation.com

RECTICEL is one of the major manufactures of insulation materials in Europe, which produces polyurethane insulation boards for different building markets. RECTICEL is active in residential building, public buildings, industry and agriculture. Recticel produces insulation products, set up systems and deliver services for the following applications: wall, roof, floor, foundations, internal and external applications. RECTICEL has developed five different renovation products for DIY market, a Massive-passive building and an Isofinish concept as regards renovation system/model for external insulation of outer walls (from concept to marketing, press, media, expositions).

RECTICEL participated in the WPs related to the supply side and supported the compelling offers developed in Belgium and their pilot tests.

1.2 PROVINCE FRYSLAN, THE NETHERLANDS

In the province of Fryslan there are about 275.000 homes, divided over 400 villages and cities. The city of Leeuwarden (the capital) has 90.000 inhabitants who live in about 40.000 homes. Over 75% of these homes were built before 1990. These houses are technically outdated and not energy efficient. Province Fryslân is stimulating international cooperation and is experienced partners in European projects and has been very successful as an organisation on European and regional programmes. The province has signed a cooperation programme with the municipality of Leeuwarden for sustainable innovation on energy and housing renovation.

The Province of Fryslân is known for its many bottom- up initiatives on energy saving and other green projects. There are over 50 energy cooperations in Fryslân, in villages and neighbourhoods. The province transfers and supports initiatives from the energy cooperations, for instance via the network of sustainable villages and the energiewerkplaats (energy workplace) or Slim Wonen (smart living) in Leeuwendal.

1.2.1 Leeuwarden[5]

Gemeente Leeuwarden

Energy saving within the built environment has been a key policy topic for the municipality for years already, also before the start of REFURB. The energy saving campaign ‘Slim Wonen in Leeuwarden’ ('Smart living in Leeuwarden') was created to make inhabitants aware of the (soft) benefits of energy saving, such as more comfort and a lower energy bill. Homeowners/ tenants can go to the website of ‘Slim Wonen’ to check their energy use and receive free and independent energy advice as well as contact information of suppliers.

[5] www.leeuwarden.nl

During REFURB, Leeuwarden has shared its insights in demand and supply factors (in WP2 and WP3) and financing (WP4), its compelling offers (WP4) and its best practices regarding quality assurance, rollout and transfer (WP5 and WP6). Leeuwarden was also WP leader in WP 5 and WP6.

1.2.2 Buurkracht[6]

Fudura is part of Enexis Group, a large Dutch energy grid operator with 4500 employees and 1500 mio Euro annual turnover. Enexis Group is publicly owned by municipalities and provences in the Netherlands. Enexis plays an increasingly active role in realizing the national Energie Akkoord (Energy Deal). As a consequence of this, Buurkracht (Neighbour Power) was founded in 2014 to support home owners in making their house more energy efficient. Buurkracht deploys an elaborate customer journey to support bottum up local initiatives in saving energy together. In april 2018 there are 278 Buurkracht neighbourhood initiatives.

During REFURB, Buurkracht has shared its insights in demand factors, triggers and barriers (in WP2), its compelling offers and customer journey knowledge (WP4) and its best practices regarding quality improvement, rollout and transfer (WP5 and WP6). Buurkracht was also task leader in WP 5.

1.3 SONDERBORG, DENMARK

Sonderborg is a climate innovative city in the south of Denmark. Sonderborg Municipality has 76.000 citizens and is also the home for the Danfoss Company headquarter and other high-tech companies focused on energy efficiency solutions.

In 2007 the Sonderborg municipality together with private companies and local utility companies created the public private ProjectZero company to catalyse and coordinate the transition for Sonderborg and its citizens, businesses etc. to become ZEROcarbon by 2029. Most successful has been the ZEROhome program, started in 2010 and focused on retrofitting the areas 18.600 private homes. The independent energy advisor, initiated contacts and actions within approximately 10% of the homes during 2010-2014.

1.3.1 AAU University (AAU)

AAU University (AAU) was inaugurated in 1974 as the fifth Danish university. AAU conducts teaching and research to the highest level in the fields of Humanities, Engineering, Medicine, Natural Sciences and Social Sciences. The Architectural Engineering division of the Department of Civil Engineering focuses on an integrated, multidisciplinary approach to achieve optimal building designs and pays special attention to their impacts on the indoor as well as the surrounding environment. The division has been undertaken number of research grants from the Danish Research Council and the Danish Energy Agency in the field of renewable

[6] https://www.buurkracht.nl/

energy and energy use in buildings. Moreover, during the last five years Architectural Engineering division has been the leader of the Danish Strategic Research Centre for Zero Energy Buildings (www.zeb.aau.dk), where research on deep renovation of the existing building stock has been one of the important topics. Finally, the University has been involved in the development of a concept for an integrated renovation process targeting private building owners.

In Refurb the University has been involved primarily in:

- Mapping demand side segmentation in UE and regions.
- Development of the optimized renovation packages.

1.3.2 Clean[7]

CLEAN is a world-leading cleantech cluster with an international focus that is based in Denmark. CLEAN is a facilitator of high-value cooperation between parties, by bringing members closer to markets, customers and peers. As a nonprofit entity, CLEAN does not directly "close deals" and negotiate commercial contracts, rather creating collaborations that ultimately lead to deals being closed and solutions being implemented. The Association has 170+ members.

In the REFURB project CLEAN has been work package responsible for WP7: communication including design of a website, newsletters, updating news, event, publications etc. on web, presentation materials, logo, local tailored brochures, final conference, invitations for events and conferences, overview of local dissemination from partner. CLEAN had been Danish country responsible for bringing input to WP3: Bridging the supply side, WP4.5: Financial constructions and WP6.1, WP6.2: Testing the compelling offer and Roll-out plan. Moreover CLEAN had an important role in input to WP2 (bridging the demand side), WP4 (construction of a compelling offer) and WP5 (Quality control) due to CLEAN´s experience with educating and supporting energy craftmen/ Better Housing advisers in Green Business Growth and the scheme Better Housing organized by the national Energy Agency.

1.3.3 Projectzero[8]

ProjectZero is a Public Private Partnership focused on transitioning Sonderborg Municipality into a zero carbon community by 2029. Sonderborg has 76,000 citizens and its major industries are clean technologies, communication, food and tourism. The aim is also to create growth and green jobs as part of the transition. ProjectZero´s core activities include planning, impact monitoring, creation of demonstration and full scale

[7] www.cleancluster.dk
[8] brightgreenbusiness.com

projects – all carried out in close cooperation with Sonderborg Municipality, regional/national grid and utility companies, industry, banks. ProjectZero created the "ZEROhome project" and the associated consortium and applied for Danish national funds (Fornyelsesfonden, regional funds). The project focused on developing mechanism´s to unlock energy retrofit within the private owned house-sector. The project and its "Charlie" is today a leading role in both Denmark and EU.

ProjectZero was WP4 leader where the compelling offers were developed. They actively worked in the introduction of the customer journey as a common practice in Denmark.

1.4 TARTU, ESTONIA

Tartu is the second largest city in Estonia. Internationally Tartu is best known as a university city with its two universities. Tartu is also a centre of ITC development. About 2% of population of the city are employed in IT sector. As an advanced IT city Tartu is also actively pursuing development of smartness in energy and government of the city. In conjunction with H2020 project SmartEnCity Tartu has undertaken renovation of several multi apartment residential buildings. Altogether 22 buildings are going to be renovated with joint effort of two projects.

1.4.1 Trea[9]

Tartu Regional Energy Agency (TREA) is a regional energy agency focused on energy efficiency in buildings, renewable energy sources especially biomass, developing and supporting of sustainable energy action plans for municipalities, feasibility studies for district heating systems. Most of TREA activities are related to energy efficiency of buildings, both public and residential. TREA has good working relations with Kredex Fund who facilitates financing schemes for renovation and energy efficiency. TREA has a strong expertise in Energy Efficient buildings through monitoring of energy consumption and indoor climate of public buildings of the City of Tartu and suggestions for renovation-Consultating of Housing cooperatives on financing scheme facilitated by Kredex Fund.

TREA focused on guaranteeing the desired result of renovation by introducing and testing in the process the institution of technical consultant which we develop into ´single point of contact´.

1.5 HALLE, GERMANY

Halle (Saale) has an approximate population of 240,000 making it Saxony-Anhalt's largest town in terms of residents. It lies on the banks of the river Saale. Halle (Saale) is also a green town of residence with its more than 7,000 hectares of water and green spaces. Besides this Halle (Saale) is an important business, technology and scientific location.

[9] www.trea.ee

In 2016, Halle (Saale) developed an energy and climate policy programme. Furthermore, Halle (Saale) supports environmental friendly living by offering energy consultancy free of charge along with the consumer association Saxony-Anhalt. Halle and the German REFURB collaborates Bauverein and isw are part of the 'Klimaquartier Lutherviertel' consortium.

1.5.1 ISW[10]

Institut für Strukturpolitik und Wirtschaftsförderung gemeinnützige Gesellschaft mbH

ISW is committed to user oriented and interdisciplinary research on economy, education and technology and has its head office in Halle (Saale). ISW has been managing the network "Urban development in Halle" (*Netzwerk Stadtentwicklung Halle*) for 20 years. This network brings together the largest municipal housing companies, cooperatives, and the public utility company. Furthermore, ISW is part of the project partnership *Zukunftsstadt halle.neu.stadt 2050* and collaborates with the energy agency Saxony-Anhalt - *Landesenergieagentur Sachsen-Anhalt* (LENA) in various projects on energy renovation, energetic model regions and others.

REFURB project profited from the results of the model project "Enterprise network energy efficiency and CO2 reduction in existing building at quarters level", which has been implemented by ISW in cooperation with three local housing societies, public utility and SME. ISW was involved in every REFURB work package and task leader of WP5.2 (D5.4 report: "Approaches to ensure the performance of the nZEB renovation").

1.5.2 Bauverein Halle & Leuna[11]

BAUVEREIN HALLE & LEUNA eG

The Bauverein Halle & Leuna is one of the biggest housing cooperatives in Saxony-Anhalt. The mission and core competence of the cooperative is the improvement of conditions of housing and the refurbishment of buildings for the members of the cooperative. The experiences of the cooperative include energetic restoration of pre-fabricted buildings, traditional build residential houses and even listed buildings. The Cooperative is integrated in a wide local network and member of different organisations and work groups in energy saving measures for the residential building market.

Bauverein Halle & Leuna participated in the whole REFURB working process and was mainly involved in WP6 'Rollout and transferability plan' in order to help preparing an implemenation plan for the rental housing sector.

1.6 GORENJSKA REGION, SLOVENIA

Gorenjska region is as one of the most developed regions in Slovenia, where incomes are highest and a lot of people are highly educated, also known of its beautiful mountain nature. Kranj, as economical centre of the region has been developing IT sector in last few years, it is also known as crypto values home place.

[10] www.isw-institut.de
[11] www.bauverein-halle.de

Within the Regional development agency of Gorenjska region, over 400 projects has been developed, funded by state, EU or other funding sources.

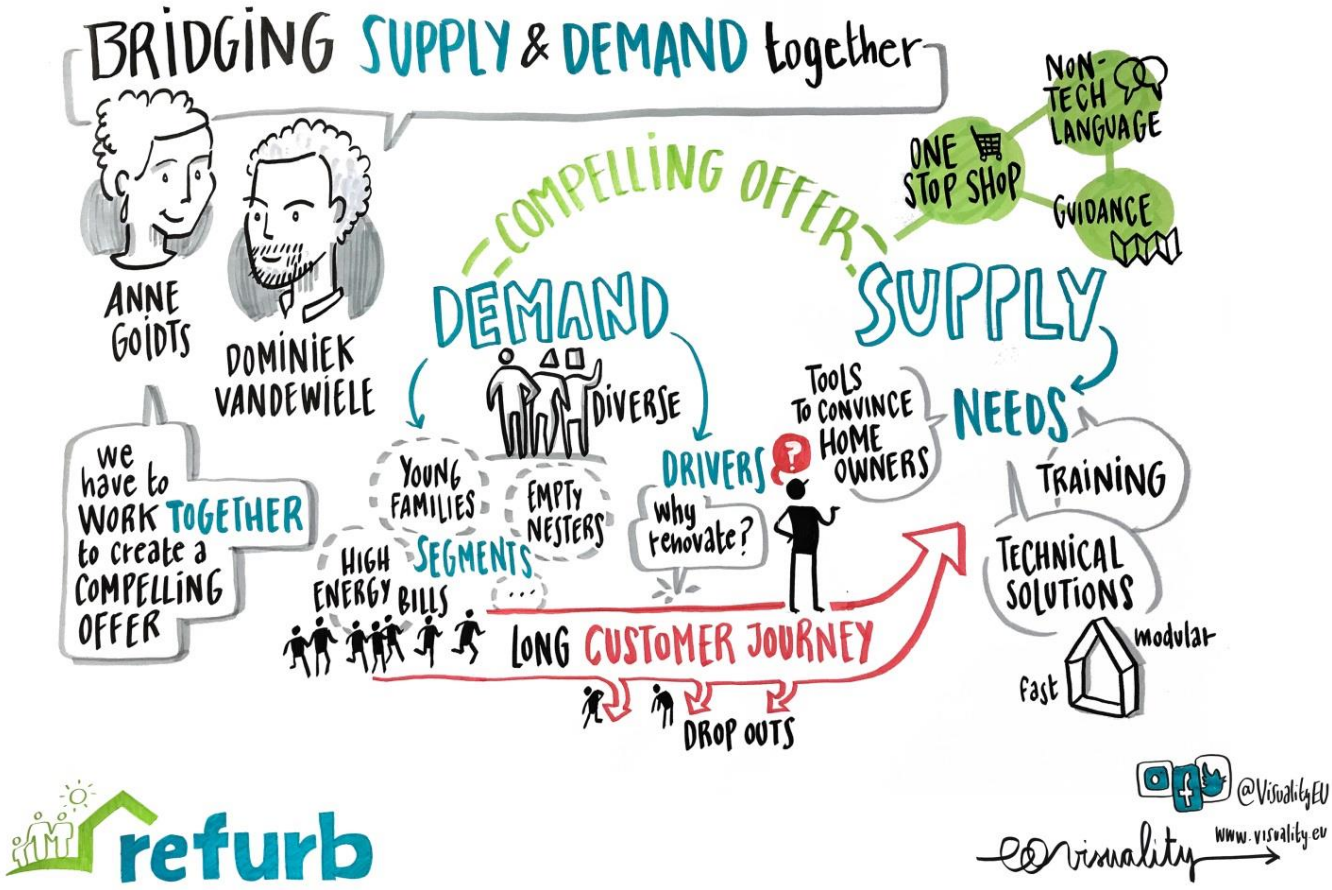
1.6.1 BSC Kranj

BSC Business Support Centre Kranj
Regional Development Agency of Gorenjska

BSC Kranj is a public regional development agency for Gorenjska region and with its activities cover region with 200.000 inhabitants and 18 local communities. BSC, established in 1995 is according to the national law technical support for regional council (consist of mayors, representatives from institution, economy and NGO) where strategic decisions about future development of the region is taken. BSC is also responsible for preparation and implementation of regional development program and strategic programs/projects. Reduction of CO2 with innovative solutions and cooperation between private and public sector is one of priority strategic tasks. BSC can also rely on a large network already including 18 local communities, one bigger secondary and higher school dealing with energy efficiency & renewables, a faculty dealing with ICT in energy efficiency, a national institute for new materials in construction and a regional office for energy.

BSC participated in the complete REFURB development; they developed the compelling offer for Slovenia and tested it.

2 Creating a Market for Deep Renovation



2.1 MAPPING THE DEMAND SIDE OF HOME RENOVATIONS

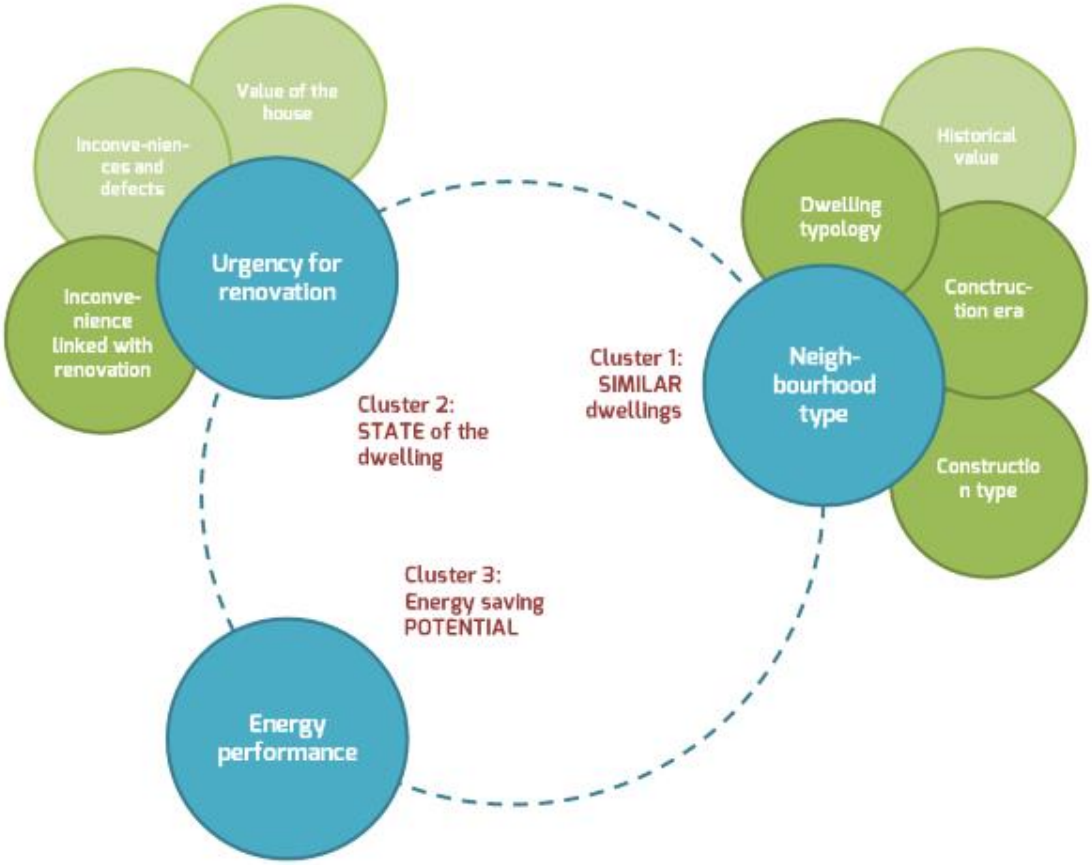
2.1.1 Customer segments

Within the REFURB project a tailored segmentation for the NZEB house renovation was developed. A segment is a group in the market with similar characteristics. REFURB used a **multidisciplinary view** to create this segmentation. This included: a behaviour study, psychology, sociology, economics, technology, legislation, architecture, building physics, urbanism. This provided an insight into how homeowners decide, plan and think, and in particular, how this could affect their choice to invest (or not) in NZEB home renovation. As a result, **six clusters with similar characteristics on the nZEB house renovation market** were defined:

Clusters of relevant **dwelling** characteristics:

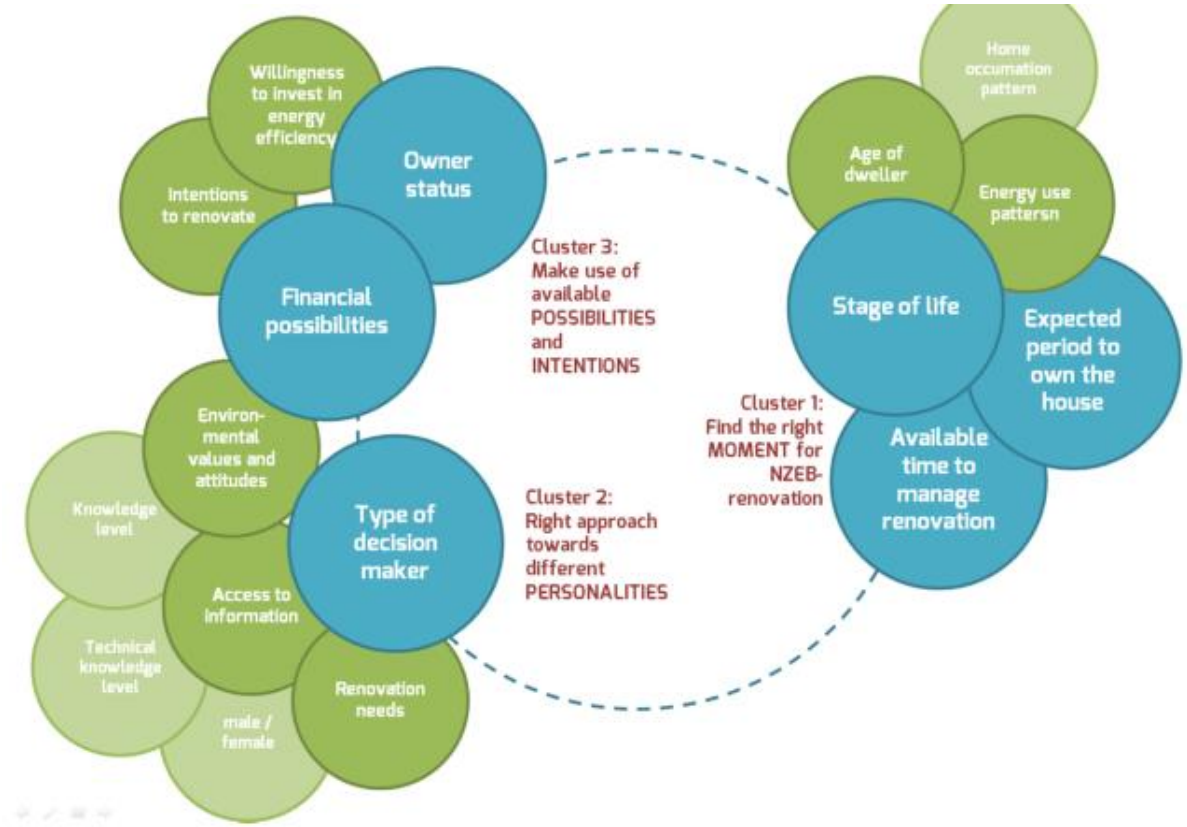
- Homeowners that live in **similar dwellings**. These can be in the same “neighbourhood type”, have a similar “construction type” or “dwelling typology”, or are from a similar “construction era” or have a similar “historical value”.

- The **state of the dwelling is similar**: the dwelling has a same “urgency for renovation”, the renovation will be accompanied by a similar “inconvenience”, the dwelling has similar “inconveniences and defects”, or has a similar “value”.
- The dwelling has a similar **energy saving potential.** This is strongly linked with the “energy performance”.



*Clusters of relevant **dweller** characteristics:*

- The compelling offer must be offered at **a similar momentum to the homeowner**. This has to do with his “stage of life”, and the “age of dweller”, but as well as the “expected period to own the house”, the “available time to manage renovation project”, his “home occupation pattern” and “energy use pattern”.
- The compelling offers must be designed to cope with groups of homeowners with similar **possibilities and intentions**. This relates to the “financial possibilities”, “owner status”, “intentions to renovate”, “environmental values and attitudes”, “willingness to invest in energy efficiency”.
- Compelling offers can target groups of dwellers with **the different personalities.** There are different “type of decision makers”, homeowners have different “renovation needs”, a different “access to information”, a “general knowledge level” and “technical knowledge level”, and it even appears that “gender” can play a role do design the renovation packages.



To avoid having too many combinations within these 6 clusters, **a matrix was used as a tool to design tailor-made segments** (based on an interplay of dweller and dwelling characteristics.) It is these segments that REFURB project identified as **high-potential market segments in Europe to design nZEB renovation packages for:**

1. "young families",
2. "Post-war suburbs with detached houses",
3. "Empty nesters",
4. "Terraced houses with a high energy bill" and
5. "Convinced energy savers"
6. "Homeowners of multi-apartment dwellings"

Young families want more focus on the sustainable housing

The future generations must have at least as good opportunities for a good life as we have today. Sustainable construction is in its good start and future generations pay more attention to a modern, healthy and energy-efficient housing, which is the framework for a good family life.

By Jesper Outzen

In ProjectZero, we have devoted our focus on launching and realizing new climate logging solutions that provide an economic benefit for the individual citizen, and which will create a CO2-neutral growth area in Sønderborg Municipality before 2029.

In this regard, we have set ourselves to learn more about what young families focus on when buying their first home. To become smarter about young families we have, among other things:

- A questionnaire survey took place at Spring University in Hørup with students from the University of Southern Denmark
- Held a questionnaire survey on Women's Day in Sønderborg together with students from the University of Southern Denmark
- Held a series of interviews focusing on the conduct of young families with students from the University of Copenhagen
- Held workshops with local partners

In parallel, we participate in a single European EU Refurb 2.0 (two Zero), together with Clean Cluster (DK), Aalborg University (DK) and regions in the Netherlands, Belgium, Germany, Slovenia and Estonia.

The young families

Age: 25-45 years

Men and women

Couple with children

Couple without children

Want to modernize the housing to suit their future needs (10-20 years ahead)

Figure 2: Article Young families want more focus on the sustainable housing, March 2017 on ProjectZero

2.1.2 Drivers and barriers for NZEB renovation

REFURB project made a thorough analysis and mapped the drivers and barriers homeowners encounter (not) to renovate. Barriers are the psychological, social, financial and other negative arguments not to carry out a renovation. These originate in motivations, desires, needs and the financial situation of homeowners. **Drivers** are the counterpart of the barriers: they are the psychological, social, financial and other positive arguments to carry out a renovation. These also originate in motivations, desires, needs and the financial situation of homeowners.

A thematic clustering of the drivers and barriers was created:

- **Technical drivers and barriers**, linked with the dwelling characteristics and the challenge to renovate to NZEB.
- **Financial drivers and barriers**, linked with the financial possibilities of the dweller and the cost of the NZEB-renovation.
- **Social and behavioural drivers and barriers** linked with the decision-making process of the dweller, so including the behaviour, attitude of the dweller, as well as the (social) conditions to take a decision.
- **Context drivers and barriers**. These are rather external factors, not directly linked with the dweller or dwelling characteristics, but deal with the particular situation or context of the homeowner. E.g. legal and administrative issues, tenant-landlord issues, organisation of the building sector, etc.

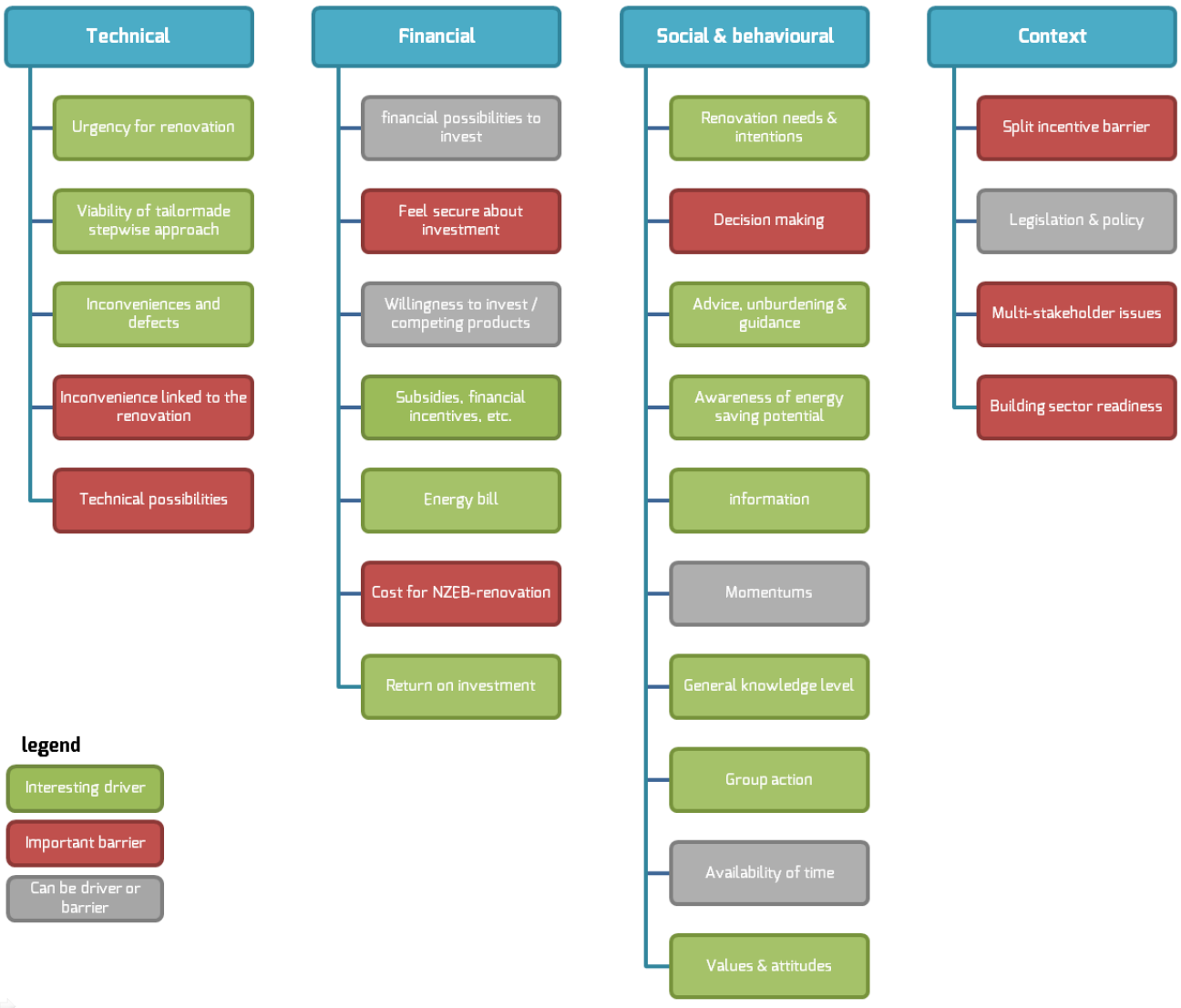
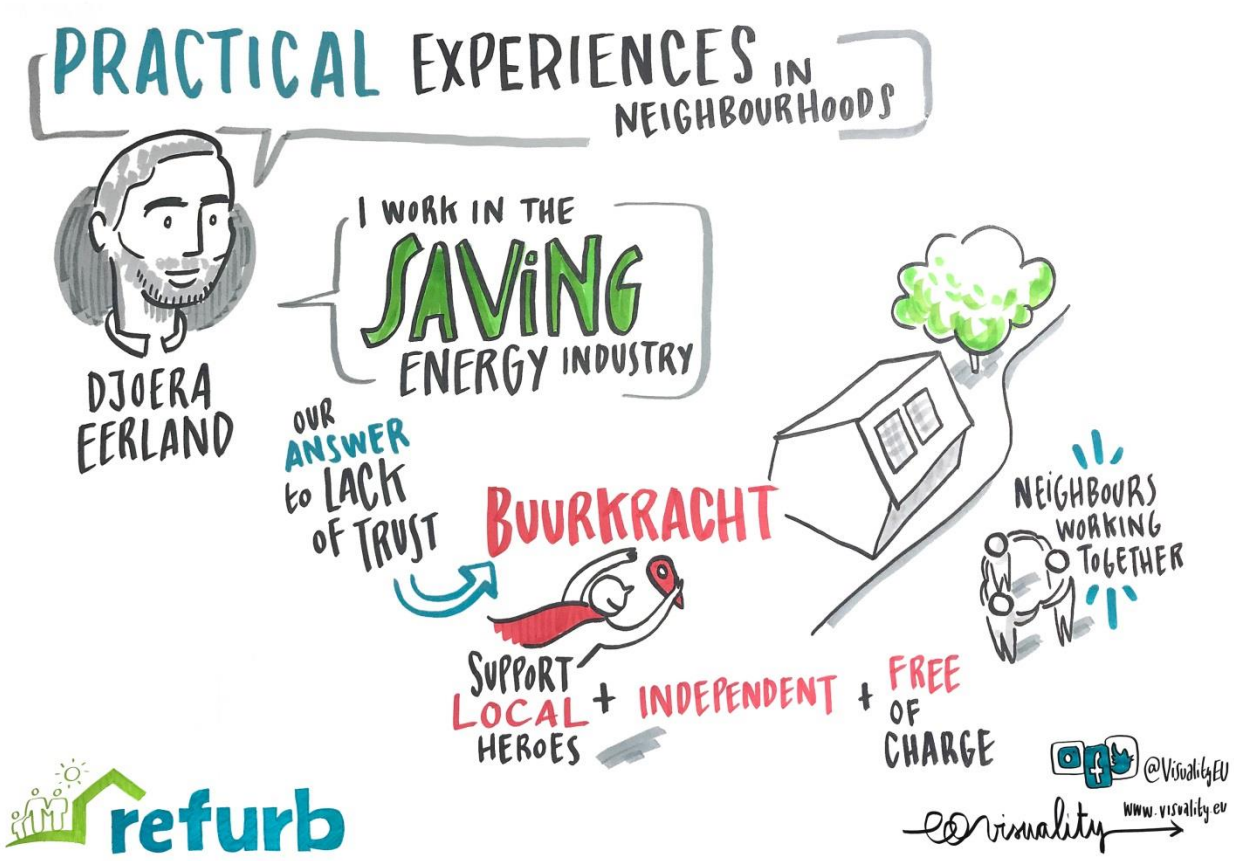


Figure 3 Clustering of drivers and barriers for NZEB renovations

REFURB found that the **6 high potential segments** (i.e. “young families”, “Post-war suburbs with detached houses”, “Empty nesters”, “Terraced houses with a high energy bill”, “Convinced energy savers” and “Homeowners of multi-apartment dwellings”), **face similar drivers or barriers.** However, local critical success

factors to tackle barriers and activate drivers for housing renovation will differ in the regions participating in the REFURB project. Local conditions define these success factors. **It was observed that local conditions may play an important role, e.g. local legislation, the mobility of homeownership, subsidy schemes, acceptance of renewable energy, building sector readiness for NZEB, the tradition of staged renovations**.

2.1.3 Demand side aggregation schemes analysis



The REFURB project made an in-depth analysis of **10 demand aggregation schemes**[12] (listed below), based on best practice experiences. Focus was given to analyse their **success factors, fail factors, and how to reduce the drop-out moments** of homeowners. Based on the analysis findings, a set of recommendations on the best way to organize the demand side was provided.

The demand side in the REFURB project refers to private homeowners, which is a diverse group of decision makers in energy efficiency investments that is not well organised and has a limited capacity and ambition to inquire about technical details of energy efficiency solutions. A demand aggregation scheme[13] refers to the ways the demand side can be organized.

[12] Analysed demand aggregation schemes: Better housing (DK); Buurkracht (NL);Green Business Growth (DK);Slim Wonen in Leeuwarden (NL);Stroomversnelling Koop (NL);Tartu apartment schemes (EE);Evening school for homeowners (DK);The ZEROhome program (DK);Pluimstraat Kortrijk (BE);Dampoort Gent (BE);COA Freiburg (DE);Ecofund (SL)

[13] It is defined within the REFURB project as: A method for cooperation of homeowners, or national / regional / local program to organize the demand side so the group of homeowners are assisted in their housing renovation process to

The main findings on the **critical success factors** in the analysed demand aggregation schemes are:

- Independent advice - averse to conflict of interest
- Unburdening - reducing the hassle and burdens of a renovation process
- Energy saving - a perspective on saving energy and money
- Governmental participation - involvement of a neutral player
- Independent decisions - homeowners are not forces into a certain solution
- Peer pressure & ambassadors - acquaintances and peers are involved to convince homeowners
- Financial incentives and solutions - to support homeowners with upfront investment costs
- Not only financial incentives - also other solutions to convince homeowners
- Personal and tailor-made approach - adapted to the particular situation of home, homeowner and family
- Targeted recruitment - focus on well-defined segments of the demand side

The main findings on the critical **fail factors** in the analysed demand aggregation schemes are:

- Weak financial architecture of the scheme – no solid business plan to target high volumes of homeowners
- Only focussing on awareness schemes - taking homeowners into a customer journey for a renovation does not stop with awareness rising
- Fail to deal with nZEB - the complexity and added value of this standard should be recognized.
- Engagement of key stakeholders is missing - the right stakeholders on the field should be involved,
- Too generic approach to convince homeowners – a non-personal approach increases the drop-out
- Weak links in the chain - all services provided, from all partners, must be of good quality
- Too dependent on volunteers – their commitment can be unpredictable
- Too dependent on external financial funding & subsidies – changes in this external funding can harm the demand aggregation scheme
- External fail factors – things you cannot influence but can influence you.

REFURB also analysed and clustered the most important motivations for dropping out of homeowners. Those are:

Technical barriers

- The intended renovation is technically not possible or appropriate.

Financial barriers

- A lack of financial possibilities to invest
- A lack of willingness to invest / competing products (prioritization of other things)
- The cost for the (nZEB) renovation is too high
- No secure feeling about the investment, e.g. because of conflicting information or a lack of trust in the demand aggregation scheme.
- A low return on investment.

Social & behavioural barriers

- Values & attitudes (e.g. lack of motivation to have an energy efficient home; ignorance about the state of the home and energy consumption)
- Momentums (e.g. not the right time to carry out a renovation process)
- Time availability

overcome barriers, and to improve the position of the demand side, e.g. towards the supply side. Demand aggregation schemes target more renovations, and/or improve the renovation e.g. in term of energy efficiency.

- Inadequate advice, unburdening and guidance (e.g. not providing enough solutions, the process is not smooth enough)

Context barriers:

- Building sector readiness (e.g. little experience with NZEB solutions, conflicting information)
- Multi-stakeholder issues (e.g. co-homeownership)
- Legislation & policy (e.g. subsidies are stopped).

Moreover, within the 10 demand aggregation schemes analysed, REFURB found several strategies to reduce the drop-out moments. **The following strategies are considered to be effective:**

- A personal approach – not limited to "generic" advice
- Creating a kind of "communities" with other participants – e.g. in a neighbourhood
- Offering homeowners a long-term perspective to start a renovation – being present for a longer period
- A toolkit of solutions and knowledge – to overcome all sorts of problems that pop up
- Integrated advice – non-contradictory expertise for all kinds of problems
- Performing communication – flexible and adapted to the context
- A meticulous planning of the renovation works – to avoid additional work and costs.

Finally, REFURB presented a set of **10 recommendations to organize the demand side:**

- Copy the success of other schemes – others paved the way
- Regard energy saving as a process, not a service or product – it is not a one-off action
- Respond to the heterogeneity of the demand side – every dwelling and homeowner is different
- Offer holistic and tailor-made solutions with a personal approach – homeowners expect more from their renovation than improving energy performance
- Gain the confidence of the homeowner – difficult but essential
- Make the scheme available for a longer period – the scheme must be available when the homeowner is ready, not the way around
- Trigger, don't push – seduce the homeowner to take the right decision
- Activate the homeowners with latent renovation intentions – this is a great potential
- Design a funding plan for the scheme, from pilot to upscaling – a solid business model makes it run over a longer period
- Enable supply side to connect with demand aggregation scheme – the supply side must be ready to deliver and meet the expectations created.

Best practice - Buurkrachtbuurten

You get energy by saving it together

Figure 4 www.buurkracht.nl

Buurkracht focuses on organising the demand side (homeowners) to save energy. Buurtkracht supports bottom-up initiatives in neighbourhoods/villages mobilizing their neighbours to save energy. So, it is their initiative, Buurtkracht plays a servant role in supporting them with all kinds of tools and a step-by-step plan designed to tackle all the barriers that prevent benevolent people from taking energy saving measures. The main barriers tackled are: taking energy saving measures is complex; suppliers are distrusted, high upfront investment, no clear insight into the benefits before investing, and no insight into the benefits after realisation. Main drivers: insight in the effects of a renovation enables getting to grips with a renovation process, comparison with others gives meaning, energy saving causes a domino effect (after taking one measure, the next will follow), doing it together locally gives momentum and drive and adds to trust. Buurkracht's neighbourhood facilitator/coach is at the heart of the process, supporting local heroes / initiators (called 'the neighbourhood team') as much (or as little!) as they want. He or she provides them with plans, a neighbourhood webpage, tips and tricks, all kinds of communication tools, and organizes the installation of smart meters in every home (to be able to monitor individual energy consumption and compare it with others) etc.

REFURB has shown Buurkracht ways to grow the Buurkracht approach from just shallow renovations to deep renovations through a staged (no-regret) approach . For example the German Energie Fahrplan and the Frisian Mienskip approach proved very inspiring. Furthermore, the REFURB contacts with partner Fryslan have sped up the establishment of Buurkracht in Fryslan and the co-financing with the Provence of 2 neighbourhood coaches there. Finally, REFURB findings on the demand side have helped develop 2 sub-propositions for Buurkracht (one for colleagues at work and one for building owners associations).

Results

Buurkracht is active in 286 neighbourhoods and has 12.000 participants (May 2018).

A reduction of well over 3,6 mio kg of CO_2 emissions has been accomplished and participants have reduced their energy costs with 1,5 mio euro by realising over a 1000 shallow renovations.

2.1.4 Customer Journey of homeowners in nZEB renovation

Within the REFURB project, work was done on **how the homeowners should be approached with the information they need to make them able to make a decision and to encourage them to invest in nZEB-renovations.** The **customer journey**[14] model was found as most suitable. Tailoring the right information through the right channel at the right moment (in the journey) to the stage at which a customer is, will help the customer continue to the next stage, and therefore closer to a purchase. The customer journey-model of VNG, "Klantenreis Energiebesparing Woningeigenaren", was adapted in REFURB.

The Customer Journey Model

The customer journey-model of Dutch VNG "Klantenreis energiebesparing woningeigenaren", which was translated and adapted as the REFURB Customer Journey model [15].

Figure 5 The REFURB customer journey and its 11 steps

The REFURB customer journey has 11 steps. Every step of the journey is essential for a successful completion of a nZEB home renovation.

Step 1 Becoming aware – it is essential that the information is (timely) received by the homeowner at the relevant moment. A relevant moment is a renovation project, an addition to the family, or at a point of time when people are motivated to invest, either by motivation or because of component break-down.

Step 2 Becoming interested – it is essential that a trusted party provides the information.

Step 3 Becoming active – it is essential that the homeowners understand why they must act now.

Step 4 Considering the offer – it is essential that the value proposition and potentially connecting to a single-point of contact (advisor).

Step 5 Financing – an indication of costs and how the investment can be financed is essential.

[14] A customer journey is the process that every homeowner goes through (the 'journey') in a NZEB-renovation. It is a model-based description of the reality.

[15] For further explanations about the search for a customer journey model, see the REFURB Deliverable D2.5 "Marketing the tailored demand drivers" Report.

Step 6	Selecting a supplier – an overview to make simple comparisons between the options and the possibility drawn on others´ experiences is essential.
Step 7	Installation and payment – a personal approach and structured communication is essential.
Step 8	Experience –impact measures and comfort in accordance with expectations are essential.
Step 9	Organizing –maintenance contract, being proactive and providing advice are essential.
Step 10	Sharing – it is essential to encourage users to share their experiences both for spreading the word of mouth publicly, but also for their own confirmation of decisions made.
Step 11	Wanting more – it is essential to stay in touch with the homeowner and to keep him/her up to date about new measures.

The following are conclusions on the **critical success and fail factors of making use of the customer journey when marketing nZEB renovation to homeowners**.

Critical success factors:

- Understanding that the journey is a process and not a one-off action.
- Understanding that the decision-making process involves non-rational decisions. So, it is necessary to speak to the individual drivers of the segment at hand at the right time in order to be successful.
- Adapt the value proposition to the target group.
- Gaining and maintaining trust is key.
- Cooperation between many organisations - governmental and non-governmental- in order to reach the homeowner and reassure them on their customer journey. When such cooperation is established take into account the strengths and weaknesses of each of those organisations and deploy them according to the latter. Bear in mind the perception of the homeowners about either of these actors when deploying them along the journey.
- Use of the monitoring of the journey to continuously adjust the marketing strategy and product development and to follow homeowners through the process in order to be able to intervene when they become 'stuck'. Understanding where the customer is on the customer journey is very important as it will determine your communication and the support to be given.
- The beginning of the journey is the hardest and contains the most drop-out hotspots. Concentrate efforts to engage homeowners in the first steps of the journey but make sure to not lose them after the very first step of awareness raising. A high energy bill, for example, can raise homeowners' awareness to save heat energy and to reduce energy costs but immediately afterwards appealing solutions need to be offered.

Critical fail factors:

- The journey is only a description of a process. The real key is using it to drive new products/services and better marketing. It is a tool which improves understanding of the demand side of the dwelling renovation market.
- Some homeowners do not have enough time to collect information and they find the overall planning too difficult. Sometimes, there is a lack of technical expertise as well. The homeowners can be afraid of overburdening themselves with planning and implementation. A fail factor can be both a lack of information as an information overload. Failing to adapt the information to the right stage in which that information is needed leads to desperation.
- Information and knowledge on subject might differ very much from homeowner to homeowner. So, it is important to share experiences with other homeowners.
- All of the above are equally valid for simple shallow renovations. If the solution offered is not a single-step deep or nZEB renovation but one or several stages of a staged renovation the ultimate goal is

easily lost out of sight. If an overview of steps of how to reach an nZEB is missing in all steps of the scheme, from communication to implementation it might result into lock-ins.

Moreover, the REFURB partners formulated recommendations for **continuous improvement** of the Customer Journey towards nZEB: **Recommendation 1: Optimal organization of the supply side t**o ensure that supply partners will continue to learn from each other. Being able to exchange lessons learned is a vital precondition for further development of nZEB solutions and ultimately long-term growth of the nZEB renovation sector across the European countries. **Recommendation 2: Support and unburden the customer.** Web tools on current energy use and the potential for energy saving, as used in Belgium and Netherlands, can raise awareness but can also provide a platform to support and unburden the homeowner/ customer, mostly in the first (but critical) steps of the Customer Journey. **Recommendation 3: Ambassadors of nZEB renovation.** Both homeowners and supply partners can become active ambassadors of nZEB and the nZEB solution they purchase or represent. **Recommendation 4: Effective communication, apply target group approach.** Continuous improvement in communication with the homeowner / customer, both offline as well as online, via websites and dedicated web tools is important to ensure effective communication on nZEB.

2.2 MAPPING THE SUPPLY SIDE OF HOME RENOVATIONS

2.2.1 Drivers/barriers according to the supply side

The REFURB project focused on an important question: How to stimulate private homeowners to renovate their house to nZEB? As one step towards resolving this question, REFURB analysed **what is driving homeowners to renovate their home to NZEB, in the eyes of the supply side[16]?** Both **drivers** and **barriers** were researched. This resulted in a list of categories (shown below) of demand-side drivers and barriers, according to the supply side.
Seven **general categories** were derived. **It was found that the supply sides' perception of the drivers of the demand side is very approximate to the real drivers of the demand side**.

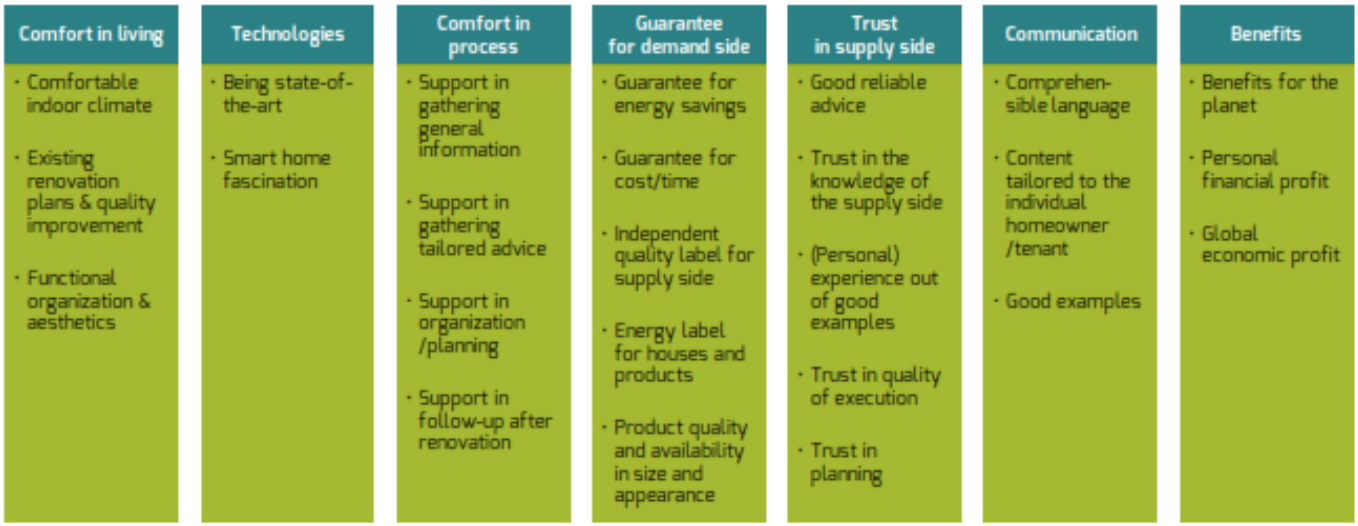


Figure 6 Demand drivers according to the supply side

[16] The supply side involves suppliers of technologies or technological solutions such as insulation and renewable energy solutions, like contractors, architects and other advisors which target the demand side.

REFURB confirmed that the main barriers in the residential sector relate to fragmentation of the renovation offer, resulting in inefficient or only partial solutions. In addition to financial restrictions and unclear benefits, homeowners do not have a structured way to obtain all the necessary information.

By looking at the state of the renovation market and listing the solutions for renovation to nZEB that are (near-)available on the market, REFURB project formulated recommendations to which existing renovation solutions can be used in **renovation packages** that are offered to homeowners to stimulate them to renovate their house to nZEB.

A clear understanding of the **country context** is required in order to estimate the replication potential of renovation packages on a national and EU level. Therefore, local conditions that influence the supply side were explored. A selection of **relevant existing renovation solutions** was presented per REFURB partner country. In general, two categories of solutions can be distinguished: technical and non-technical solutions. The **technical solutions** are less country-specific and are listed in three categories. These are linked to the building typologies in each country:

- Building envelop,
- Technical installations and
- Renewable energy sources

Looking at the **non-technical solutions** listed, the following categories can be distinguished:

- Innovative financial models (new ways of financing)
- Online tools for management or decision making (which are partially applied by one-stop-shops either as a lead-producing tool or as a first information tool)
- Demonstration projects or showcases visible to other homeowners
- New approaches to organising the supply side through building teams of smaller craftsmen
- Quality assurance
- Renovation packages = One-stop-shop-solutions
- Other solutions (such as innovative communication and marketing).

Good solutions will likely cover multiple aspects. The **non-technical solutions are more important than the technical solutions to seduce homeowners to renovate to nZEB**.

Additionally to the REFURB countries relevant existing nZEB renovation solutions analysis, the so called **One-stop-shop concepts for home renovations** were analyzed. The One-stop-shop-solutions (or renovation packages[17]) seem to have the highest potential to convince the homeowner to renovate to nZEB since they offer a holistic approach. Out of the examples of one-stop-shop concepts analysed in Europe, these **common characteristics of existing one-stop-shop-solutions** were identified:

[17] For the purpose of this project, the term 'renovation package' means: *"An easy-to-understand commercial offer to an end-user, written in non-technical language which satisfies his/her requirement for comfortable living but at a higher energy-efficiency of his/her dwelling. The offer comprises the optimum combination of technologies to be installed in the most logical sequence, tailored to the type of dwelling, the state of the building, the geography in which the dwelling is located and socio-economic parameters. Offers are understood to entail the unburdening of the end-user, so he/she is assured of an agreed higher energy efficiency without having to worry about individual technology choices."*

- Targeting individual homeowners.
- Initiative from government or supply side.
- Personal approach to the homeowner.
- Tailored integrated masterplan is offered to the homeowner to avoid lock-ins.
- Step-by -step approach is possible: homeowner has the choice between one deep renovation or a stepwise renovation
- Organisation of the supply side with one single-point-of-contact for the homeowner
- Marketing is important to get the offer well-known, but is often missing.

It was clear that the specific country context determined the success of the one-stop-shop solutions. Furthermore, many of the analysed one-stop-shop-solutions are not isolated initiatives. Most of them are embedded in a much broader programme, project or campaign, with clear demonstration projects, etc.

One-stop-shop – SLIM wonen Leeuwarden

Slim Wonen in Leeuwarden is a program to stimulate energy saving. The website[18] offers a CJ and one stop shop for energy saving and energy renovation.

Slim Wonen in Leeuwarden also entails a neighborhood approach to energy saving, where energy saving on neighborhood scale is facilitated and stimulated by the municipality of Leeuwarden, for instance by educating energy ambassadors. Energy ambassadors are trained volunteers that can help neighbors save energy.

Brief description
Slim Wonen in Leeuwarden is an independent one-stop-shop for energy saving and energy renovation, which entails the website and also Facebook:

www.slimwoneninleeuwarden.nl
https://nl-nl.facebook.com/SLIMwoneninLeeuwarden/

The website Slim Wonen in Leeuwarden offers homeowners/ tenants an CJ and provides insight and independent advice on energy saving and energy renovation. Local suppliers offer their energy services. A

[18] www.slimwoneninleeuwarden.nl

homeowner can opt for single energy measures to full- blown deep energy renovations, offered as one stop shop solutions.

Slim Wonen also has its own energy coach, Klaas. Energy coach Klaas was hired as a single point of contact for households with lower incomes in 2017. Households with lower incomes receive a card in their mailbox, offering free and personal energy advice and also some free energy measures such LED bulbs. Klaas helps tenants/ homeowners achieve energy saving by tackling some so- called low hanging fruits, which importantly also includes smart energy behavior. Since the start, Klaas has paid one or more visits to more than 350 unique households.

For an insight in Klaas' activities, see https://www.youtube.com/watch?v=4qlaF4HabLo (in Dutch).

During REFURB, the success of the one-stop -hop Slim Wonen in Leeuwarden was shared with and picked up by other Frisian municipalities, which resulted in a scale up of activities from local to regional level. As a result, the Frisian one stop shop Duurzaam Bouwloket was established. The energy coach for lower incomes has been a great success and the project will be continued in 2018. By April 2018, a second energy coach for residents with lower incomes will start, which is expected to lead to double the number of visits in 2018 as compared with 2017.

Results
During REFURB, the one-stop-shop concept was scaled up from Leeuwarden to Fryslân. In addition, a second energy coach for lower incomes was hired for Leeuwarden.

Facts & figures
Number of shallow renovations per year (Leeuwarden): 900
Current number of Facebook followers: 1926
Current number of energy coaches: 2

Further reading
For more information, see D5.1, D5.2 and D6.2.
www.slimwoneninleeuwarden.nl
https://nl-nl.facebook.com/SLIMwoneninLeeuwarden/

2.2.2 Involvement and organisation of the supply side

REFURB **identified key lessons learned** regarding the involvement of the supply side in one-stop-shop solutions for nZEB renovations. They are:

- **A supply involvement strategy should be able to adapt, depending on the type of supply side actor and specific renovation package.** In the analysed examples, there was a clear focus on the following key actors[19]:
    1. Energy and renovation advisors (including related consultants such as energy experts, ventilation expert etc.);
    2. Craftsmen and contractors;

[19] The role of architects was not explicitly covered, but it can be assumed that they can take up both roles: the architect as a renovation advisor, or the architect as a building professional.

- **Provide dedicated training programmes.** The majority of the training initiatives for the supply side concentrate on the technical training to address the issue of quality constructions and renovations. Few initiatives were found about training the supply side on the behavioural change.
- **Provide support to the involved partners,** this way unburdening the supplier. To improve the level of engagement, it is recommended to clearly point out the benefits when participating (basically providing the answer to the question *"what's in for me")*. Identified examples include: access to tools; administrative support; access to information and network.

Closely related with previous point:

- **In order to reach SMEs, the threshold to participate in a renovation package should be low enough.** This means that the concept should be clear and not too time demanding for small craftsmen companies or SMEs.

Lastly and equally important,

- **creating a community and providing network opportunities** allow partners to exchange experience and to collaborate with each other. Partners should have the feeling that they join something greater. Setting up a recognisable brand (branding) further complements this.

Taking into account the success and fail factors as identified earlier, the following recommendations are suggested for **organising the supply side**:

1. **Develop a solid business case** between a single-point-of-contact to the homeowner (e.g. a renovation advisor) and the building professionals. Interdependency was quoted as a prerequisite.
2. **Compose a "pool" of building professionals.** A distinction should be made between renovation advisors on the one hand and building professionals on the other hand (which can be further distinguished in craftsmen or contractors, architects, and engineers or consultants). Ideally, this pool should be of cooperative instead of competitive nature.
3. **Define quality requirements** which have to be met by building professionals as a prerequisite to participate in the renovation package. However, the level of complexity and associated costs should be limited in order to engage the smaller SMEs as well.
4. Offer **good training programmes**, to ensure that all building professionals and renovation advisors possess the required knowledge level and skills to participate in the renovation packages.
5. Take into account the **time investment and financial aspects** associated with the NZEB renovations investment by the customer. These can be barriers, both for the demand side as the supply side.

One stop shop – ZERO bolig 4.0

Figure 7 ZEROhome energy retrofitting area of app. 18.600 private owned homes

Late 2010 ProjectZero launched its ZEROhome (ZERObolig) program focused on engaging homeowners in energy retrofitting the areas of app. 18.600 private owned homes. The program was focused on qualified ways to improve the individual homes' current energy standards. It also served as role model for how energy retrofits of private homes can create new green jobs.

To help answering the homeowners' question "what needs to be done?", the ZEROhome program offered a free energy review/consultation carried out in their homes. The consultant's name was Charlie, and he became a synonym with the ZEROhome program. During the consultation the energy consumption was reviewed, improvement opportunities and costs discussed and an action plan defined.

Next step was to connect the homeowners with qualified craftsmen to get the job done in a qualified way. To secure the ZEROhome-program, ProjectZero together with the technical college and vocational school (EUC Syd) have implemented a craftsmen training program to improve their energy understanding and energy consulting competences.

Homeowners often need to finance the retrofit, and ZEROhome therefore has worked with the areas' banks to secure a good understanding of the cash-flow in energy retrofits and competitive loans for the homeowners.

Real estate agents, consulting engineers and architects are other partners of the program. Together with local architects the ZEROhome project developed an inspirational catalogue to help the homeowners integrate their own ideas into their energy retrofit and create a cheaper, better and more climate-friendly living.

Demonstrating the creation of new green jobs was an important part of the ZEROhome program. Demonstrating the job creation was an integrated part of the project. By creating more awareness, interest and desire for energy retrofit the project generated more than 100 jobs in the construction industry.

Results
The REFURB project has built upon the ZEROhome learning, but allowed Sonderborg and its ProjectZero to transition into the society based Customer Journey and a much stronger understanding of how to create the compelling offer to specific home-owner segments – including the five created offers, that fits not only Sonderborg but Denmark across municipal boarders.

Since 2010, nearly 1,800 power lines have been implemented, established more than 1,600 private solar systems and more than 1,000 heat pumps in the Sønderborg area - and the numbers grow day by day.

Further reading
http://www.projectzero.dk/da-DK/Borger/ZERObolig.aspx

Testimonials
http://www.projectzero.dk/da-DK/Artikler/2017/Marts/En-ung-familie-g%C3%A5r-gr%C3%B8nt.aspx
http://www.projectzero.dk/da-DK/Artikler/2017/April/Familien-Pallesen-f%C3%B8lger-str%C3%B8mmen.aspx

3 REFURB's Integrated Home Renovation Services

3.1 DEMAND AND SUPPLY COMBINATIONS

Within the REFURB project, the interplay between the segments (dwellings, dwellers), the drivers and the solutions (technical, not-technical) for nZEB house renovation were thoroughly explored.

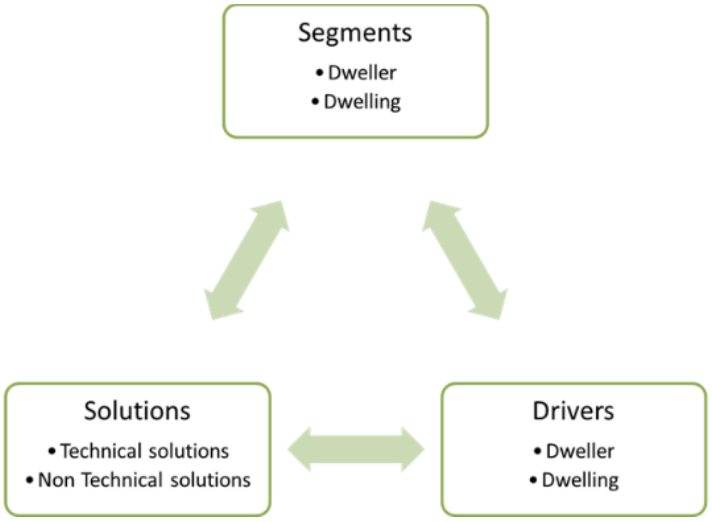


Figure 8 Interplay between segments, solutions and drivers

The goal was to find cross-links between drivers with matching solutions for each of the five generic high potential segments in nZEB house renovation which REFURB had identified. The cross-links results served as a basis and inspiration for the local tailoring and initial preparation of the REFURB's compelling offers.

Demand and Supply Combinations - key findings for the five-generic high potential segments in nZEB house renovation

Segment: Young families

Driver	Solution
Have no time, money or experience.	Need for one-stop-shop and new ways of financing presented at the right moment.
Renovation need.	All relevant technological solutions should be implemented in order to reach nZEB standards.
Largely driven by social and behavioural elements, energy saving matters.	Need easy tailor-made approach and renovation coaching which speaks to values and attitudes.

Segment: Post-war suburbs with detached houses

Driver	Solution
Dominated by technical drivers but the investment cost is a barrier	Need for new ways of financing and cost reduction
Urgency for Renovation	staged renovation offer needed due to cost barrier and to avoid lock ins and to reach the NZEB standard.
Have a high potential for energy saving and react to group action	Need new approaches for organizing the supply solutions including the use of peer pressure and targeted recruitment.

Segment: Empty nesters

Driver	Solution
No urgency for renovation	Time to explore Online tools, gather information and make sure to the Quality Assurance is in place
Have Money and Time available and will like to feel confident about the renovation before they go all the way to a NZEB standard	Staged renovation guided with independent advice and expert Renovation coaching
Low energy bill due to low occupancy makes the ROI a barrier	Persuade through Targeted recruitment, Peer pressure and Ambassadors schemes

Segment: Terraced houses with a high energy bill

Driver	Solution
Dominated by technical drivers and multiple decision makers (depending on ownership).	Need for New approaches to organizing the supply side providing targeted solutions.
Urgency for renovation and motivation of a lower energy bill.	Renovation packages in a one stop shop or a staged approach depending on the economic situation of the segment.
The legislation and Policy might be a barrier due to regulations on heritage and limitations on external insulation of facade	Need for Government involvement

Segment: Convinced energy savers

Driver	Solution
First mover segment driven largely by Social and Behavioural elements where Awareness of energy saving potential is a main driver	Quality assurance and online decision-making tools are relevant solutions.
Feel secure and are willing to invest, but do not have the financial possibilities	New ways of financing are important solutions.
Technically the building might not need a renovation which makes the business case for energy saving difficult	Focus on Non-financial incentives and Targeted recruitment solutions as this group will serve as the good Ambassadors for others

3.2 LOCAL TAILORING AND OVERVIEW OF REGIONAL DIFFERENCES

All country partners in the REFURB project carried out a tailored analysis of their individual markets and created a solid overview identifying **key local segments, drivers and solutions.** Two main groups of segments have been identified across the countries:

- Single Family Houses (SFH) with Young Families (YF) and Empty Nesters (EN) as dwellers.
- Multi Family Houses (MFH) with Owners and Tenants as decision maker and dwellers.

Single Family Houses: Belgium, The Netherlands and Denmark identified the Single Family Houses with either a Young Family or an Empty Nester as the most relevant dweller segment for their country. Germany and Slovenia also identified the Single Family Houses as a main dwelling segment. However, Germany with focus on the more specific dweller group, under the Empty Nester category, identified as the Open Minded Sceptics and Slovenia with the Young Family as their main focus for a dweller segment in this category.

Multi Family Houses: Germany identified the Multi Family Houses owned by a Housing Cooperative as a main segment and Slovenia and Estonia identified the Multi Family Houses with privately owned apartments as their high potential segment. The dweller analysis of the Multi Family Houses was divided into an Owner (building Manager) and in the case of the Housing Cooperatives, a Tenant segment, living in the apartment as a dweller. Decisions for renovation in this segment are based on a democratic process guided by regulation specific for each country.

Estonia identified a sub segment of dwellers who own their apartments, but do not live there, instead renting it out to a third party, typically students. This segment is named “Absentee Owners” and have similar drivers compared to the building Managers.

Drivers: For each segment the relevant local drivers were identified and the similarities between countries illustrated in the table below, where the drivers highlighted in bold show that the driver has been identified as key by more than three countries.

Dwelling Segment	Dweller Segment	Drivers
Single Family Houses	Young Family	• **Urgency for renovation (identified as KEY by three countries or more)** • **Need financial Solution (identified as KEY by three countries or more)** • **Adjust functionality to fit modern life style needs (identified as KEY by three countries or more)** • No inconveniences (identified as KEY by two countries)
	Empty Nester	• Step by step (identified as KEY by two countries) • Solution as part of an investment (identified as KEY by two countries) • Low cost high comfort (identified as KEY by two countries) • Motivated by recognition (identified as KEY by two countries) • Financial possibilities (identified as KEY by two countries) • Expert advice (identified as KEY by two countries)
Multi Family Houses	Housing Coop. Owner/Manager	• N/A as only one country has this category
	Housing Coop. Tenant	• N/A as only one country has this category
	Private Owner	• Lowering cost • Open to new technologies • Comfort Living
	Private Manager and Absentee Owner	• Subsidies

Solutions: For each segment a list of key solutions were identified addressing the identified drivers of the segment. The solution tendencies across the countries are illustrated in the table below. The solutions highlighted in bold show that the solution has been identified as key by more than two counties:

Dwelling Segment	Dweller Segment	Non technological solution
Single Family Houses	Young Family	• **One-stop-shop** • **Visualization of Renovation** • **Renovation grants and loans** • **Best practice/ Cases**
	Empty Nester	• **Step by Step** • **Holistic financial plan** • **Investment plan** • **Local partnerships who can fill in a staged approach** • **Expert advice (free and independent)**

		• **Best practice/ Cases**
Multi Family Houses	Housing Coop. Owner/Manager	• N/A as only one country has this category
	Housing Coop. Tenant	• N/A as only one country has this category
	Private Owner	• Subsidies
	Private Manager and Absentee Owner	• Subsidies

3.3 SUPPORTIVE FINANCIAL CONSTRUCTIONS

The goal of the REFURB project was to create renovation packages ('Compelling offers') for nZEB house renovation by developing an integrated approach which bridges the gap between the demand and supply side. A step towards this goal was an investigation on suitable financing constructions within the REFURB countries.

It was found that there are a number of financial stimuli to reward homeowners when they conduct nZEB renovation. This can be **coaching, grants and subsidies** for individual energy-efficiency related renovation measures of the building envelope or the technical installations. Another option is **tax stimuli** such as tax deduction for selected renovation measures (Denmark) or tax reduction on property (Belgium, Flanders) in case of achieving a certain energy efficiency level with the renovation.

3.3.1 Single family houses

Financial challenges

Country	Challenges
Denmark	1. The valuation of houses are not updated by law and does not include the energy standard 2. Attractive packages of energy renovation offers for the end customer are missing 3. The finance sector is not given authority to require professional energy checks- up as a condition for an energy loan and have too little knowledge about the advantages of energy renovation 4. The subsidies and fiscal instruments are very low and limited
Belgium (Flanders)	1. The need for pre-financing: Renovations up to nZEB level require a high upfront investment. 2. Orienting the energy renovation investments, with sufficient attention for other housing aspects such as living quality 3. The need for financial resources for unburdening and counselling of dwellers for the preparation and implementation of energy saving investments 4. A higher deployment of fiscal instruments to stimulate energy saving investments
Germany	1. House owners often decide against deep renovation and go for single measures or a stepwise approach 2. EPC ('Energieausweis') needs further improvements to be trusted

	3. Technical potentials and funding need to be tapped in practice 4. Transparency is the first step towards taking action 5. The customer's needs should be paramount and in focus
The Netherlands	1. Loan to value is a still a relatively new type of arrangement to stimulate nZEB renovation. 2. There is a level of uncertainty whether the theoretical estimation of the amount of energy saved due to nZEB renovation will actually be reached in practice. 3. The payback period for nZEB renovation is still very long. 4. The amount of money that needs to be invested for nZEB renovation to be carried out to full extent is considerable. 5. Financial institutions are hesitant to provide loans for nZEB renovation for individual homeowners as they consider this to be a high risk financial product

Financial recommendations for nZEB renovation in single family houses

- Fiscal regulations and subsidies

Much stronger fiscal regulations and subsidies like the one seen in Germany by the public bank, kfW are needed. Good loans with low interest rate and grants can be provided, if documented that a certain energy standard is achieved. However, it is recommended to regulate the conditions since there is a need for both implementing energy savings related to the easily achieved low hanging fruit and the more costly nZEB renovation.

Furthermore, in Denmark, because of low energy prices, there is a decreasing interest for energy renovation that is not seen in the other countries. There is a need for more focus on implementing some of the many recommendations in the Danish energy renovation strategy plan to achieve the EU recommended nZEB standard. This can be tax deduction on property, as seen in Flanders, where home homeowners are rewarded for achieving planned energy renovation. On the long term, it is recommended that housing taxation should be based on energy performance and living quality (possibly along with other criteria).

- Financial construction of packages with focus on health, comfort, esthetic

Financial unburdening of the homeowner, giving them an overview of the possibilities, are recommendations especially for the Netherlands and Belgium; a point to consider, when composing the renovation packages within REFURB. Especially more incentives for young families are needed since they are challenged the most when buying a house. The development of new business models for innovative support mechanisms, such as guarantee funds, Energy Performance Contracting, renovation cooperatives, crowdfunding initiatives should be considered. The subject of finance cannot be seen as a 'stand-alone solution'. Clearly quality assurance has to be provided from the building industry and the homeowners need to have access to affordable financing and quality guarantees.

- Loans and mortgages

There is a need for bank/mortgage loans combining cheap energy loans on the condition of energy consultancy or standards. Furthermore, this technical support can be an integrated part of the financing scheme. For instance, energy audits as a prerequisite to benefit from financial loans or the technical support funded through the financial program. It should be allowed for the bank adviser to set conditions such as an energy check-up, to secure that the loans granted are well invested and that energy savings are prioritized.

- More effect of EPC and regulation of valuation of houses

Surveys among real estate agents strongly indicate that the EPC can be improved to further stimulate its effect on house pricing. Improvements can relate to making the EPC and the expected benefits more visually understandable, providing cost information of renovation measures and expected energy savings and showing the relation between the simulated energy score and the actual energy consumption. Also, a common standard for value estimation of houses including energy performance is a central element that

could push the market and the demand for nZEB renovations. There is a need for an update on the regulations about value estimation of houses reflecting the energy standard.

3.3.2 Multi family houses

Financial challenges

Country	Challenges
Estonia	1. Ability (or lack) of Housing associations to apply the loan for renovation and to service it. 2. Exhaustion of subsidies. The funds for current renovation subsidies were calculated to last up to 2020. 3. The lack of initiative from the housing associations
Slovenia	1. EPC obligation for all buildings are missing. 2. En Svet consulting – need to be significantly improved – more in deep consulting and support 3. The regional support system is not sufficient, it needs to be established in counseling 4. Bank loans are too expensive and too short termed

Financial recommendations for nZEB renovation in multi-family houses

- Subsidies,EU-programs
  KredEx (Estonia) and national Eco fond (Slovenia) with 25-35% subsidy

Different scenarios can be set up for implementing energy renovation. As for the future, there is no other plan or proposal than keep using the KredEx program and the Eco fund program, as long as there are financing possibilities. These programs have neither been negotiated nor adopted by the parliament. The subsidy program is not a financial measure but foremost social. All financing and conditions are not negotiable.

- Further develop and support local energy advice programs

The regional support system needs to be established in counseling (including empowerment of owners of flats, education of the contractors and consulting). Local communities need to continue with supporting energy measures. It is recommended to further develop energy advising ex. “En Svet General Consultancy” in Slovenia, so that they can offer a good guidance for step by step nZEB renovation.

- Further develop fiscal regulations

It is recommended to implement national tax reductions for owners of buildings for the implementation of energy efficiency measures. That would be beneficial for the state – better housing stock (less CO2 emissions) and for the building market. Regulation from the government are needed to empower more financial discipline.

- Provide attractive loans

If regions would have higher economic growth and banks would become less restrictive, with favorable loans from banks and higher income of the inhabitants more people would decide for deep renovation. Therefore, a suggestion is made that ECO fund and KredEX to try to work with banks on a long-term system in which banks would demand less insurance and lower interest rates for loans.

3.4 REFURB'S COMPELLING OFFERS[20] FOR INTEGRATED (NZEB) HOUSE RENOVATION SERVICES

Within the REFURB project, a "compelling offer" was defined as a soft proposal to a specific market segment, whereas a "renovation package" was considered as a mix of technical renovation measures. Specifically, the term Compelling offer means:

- An easy-to-understand commercial offer to an end-user, written in non-technical language which satisfies his/her requirement for comfortable living but at a higher energy-efficiency of his/her dwelling.
- An offer comprising the optimum combination of solutions/technologies to be installed in the most logical sequence, tailored to the type of dwelling, the state of the building, the geography in which the dwelling is located and socio-economic parameters.
- An offer that unburden the end-user, so he/she is assured of an agreed higher energy efficiency without worrying about individual technology choices.

REFURB developed a methodology, the toolbox and a template for creating the compelling offers, and a database of (10 country specific and market/ownership segment related = single or multi-family houses, focused on private homeowner) compelling offers for BE, DK, DE, NL, SI and EE. These compelling offers were based on one or more renovation packages, aiming toward nZEB renovations in their respective national markets.

The compelling offer creation was based on the **Lean start up methodology** and uses the following tools:

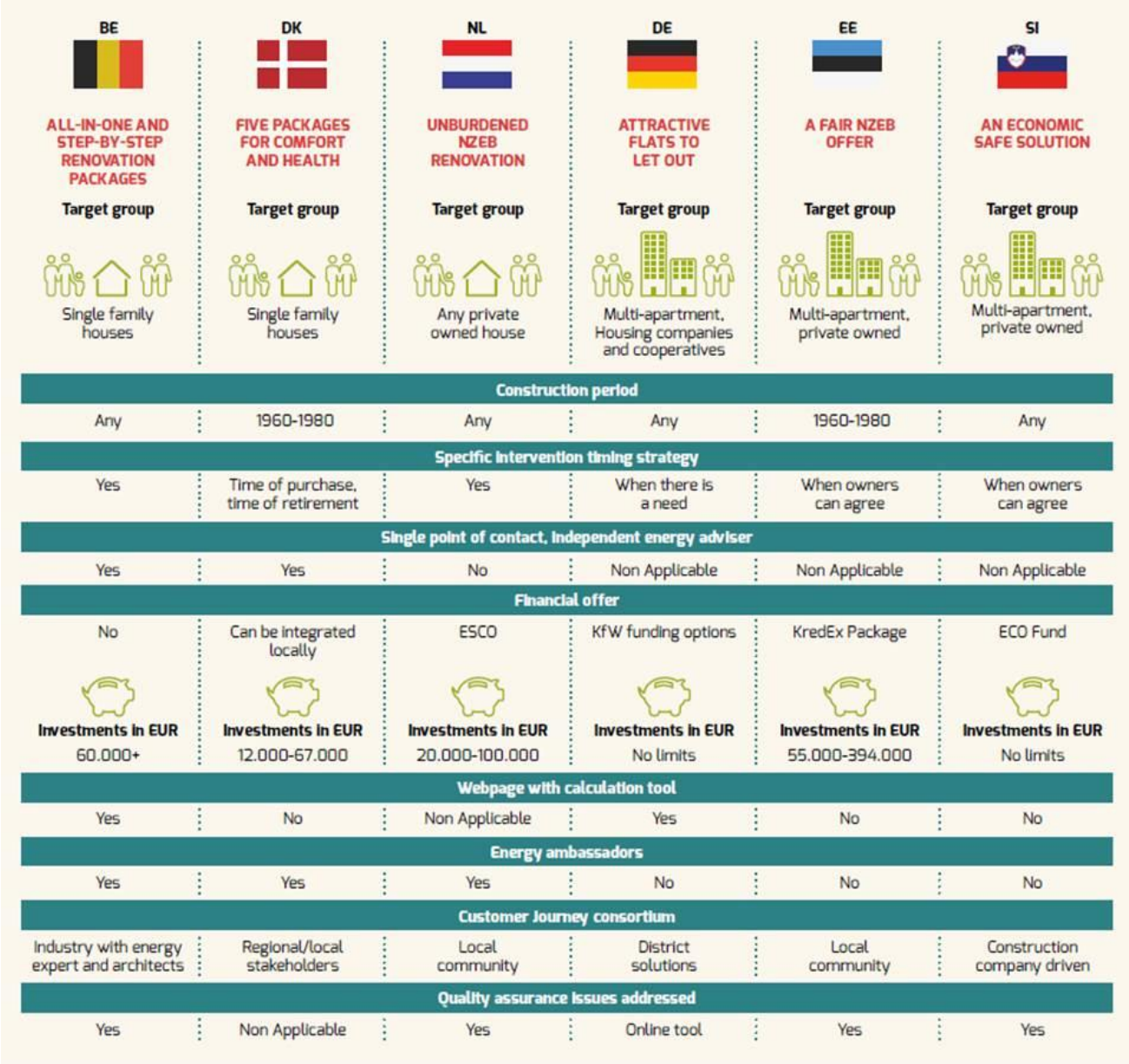
- the **Customer Journey**, describing how homeowners in 11-steps can be inspired from "becoming aware" in step-1 until "wanting more" in step-11
- the **Value Proposition**, describing how homeowners value gains and pains associated with the energy retrofit and how gain creators and pain relievers will be developed
- the **Business Model generation**, used for creating a new business model for homeowners and stakeholders associated with the Customer Journey.

In summary, the steps in the compelling offer creation are:

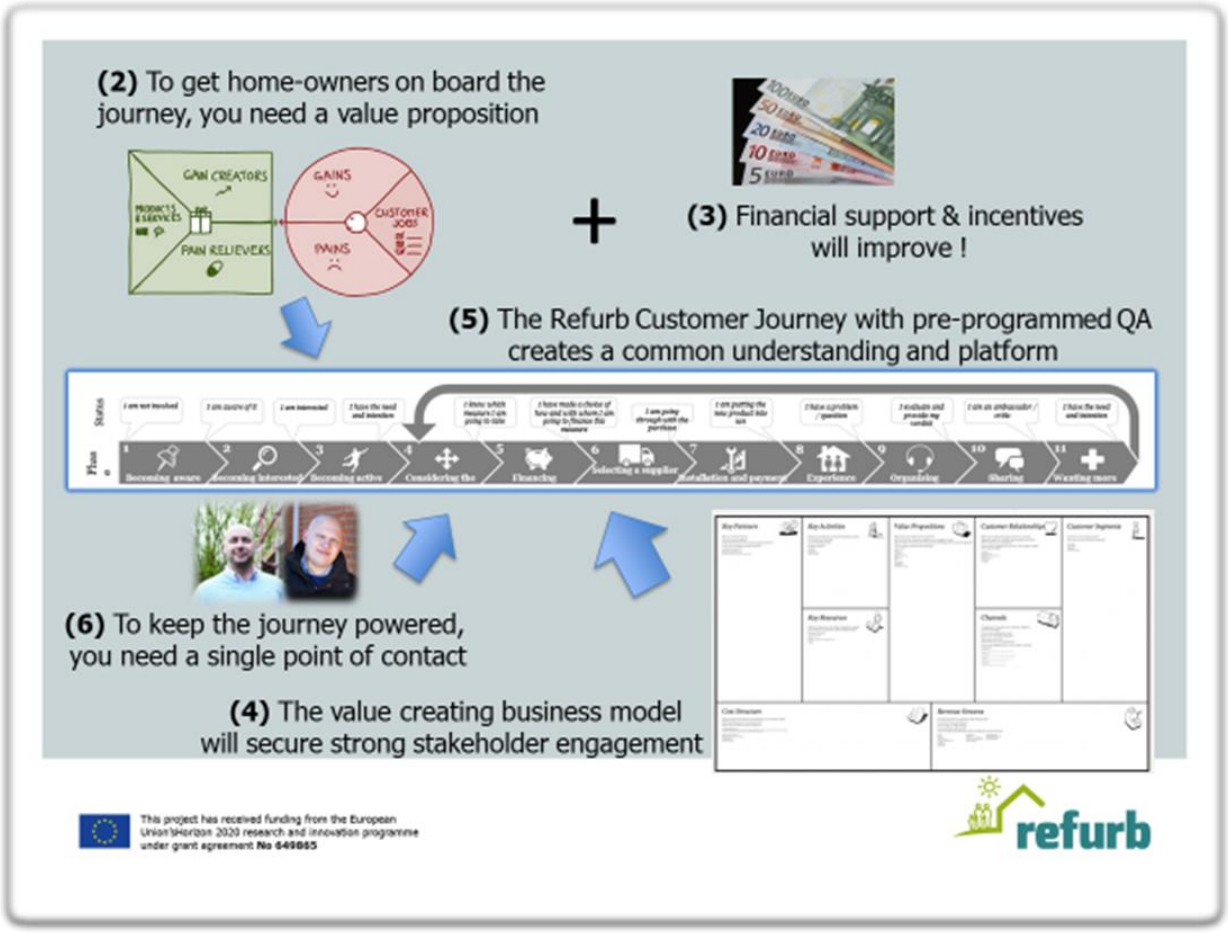
1. Decide your market segment
2. Use the customer journey to identify the stumbling blocks and advantages/actions
3. Generate the value proposition
4. Describe the business model
5. Add the financial support (optional)
6. Appoint a Single point of contact (if required).

It should be pointed out that the offers are tailored-made to address the specific needs and opportunities within each of the six countries, therefore, there seems to be limited cross-border synergy between the offers. Nevertheless, these offers serve as inspiration for creating new compelling offers using the REFURB offer creation methodology presented in this report. An overview of the **REFURB country-specific compelling offers** is shown:

[20] The Country Specific Compelling Offers can be found at: http://go-refurb.eu/concept/compelling_offers/



The graph below illustrates the REFURB toolbox (Customer Journey, Value Proposition and Business Model Canvas) as linked together, forming the basis for creating a successful REFURB Compelling offer for a specific dweller/dwelling segment.



Example - Renovation packages for Denmark

A main feature of the compelling offers developed in Denmark are the set of technical renovation measures and the way it is communicated to a targeted market segment as an all-in-one renovation package.

Five renovation packages for deep renovation were created ranging between up to 12.000 and 67.000 € and bringing energy savings between 30 and up to 80%. Included is a so called *'a-la-carte'* offer allowing the homeowner a customized solution.

Initially, developed renovation packages were optimized purely focusing on the best cost optimal, theoretical, energy savings. After several surveys and meetings with renovation market stakeholders, such as, building owners, energy renovation contractors, financial institutions and energy consultants, the initial renovation packages were redefined in order to take account for other very important values. This included: securing investment in the renovated real estate, comfort, architectural aesthetic, and 'low hanging fruit energy saving solutions.

Figure 9 The five Danish renovation packages

Figure 10 Prototypes of leaflets targeted to young families (upper) and empty nesters (lower right)

The INDOOR-CLIMATE package mainly addresses the young families. The ENERGY and COMFORT packages mainly targeted the empty nester families. The START-UP and the A-LA-CARTE packages targeted both segments. The investments in the five packages are estimated within the range €12,000 – €67,000. Two packages, the START UP package and the INDOOR-CLIMATE package provide energy savings of 15-30 % (staged deep renovation), while the ENERGY package, the COMFORT package and the A-LA-CARTE package give energy savings between 70-80 % (deep renovation).

Example - Village ESCO

An innovative compelling offer named 'village ESCO' entails a tailored deep energy renovation solution (nZEB) for each participating 'villager/ homeowner'. The local energy cooperation handles the entire renovation process: financing, contracts with local suppliers and quality guarantees. Agreements with homeowners and local suppliers are elaborated in a personal energy saving contract. Once the contract is signed, the homeowners is completely unburdened from beginning to end. However, financing of the energy renovation is not done for each individual dwelling, but for a group of dwellings. However, the energy cooperation strives for societal profit instead of 'traditional' profit. With the societal profit gained, various facilities in a village can be maintained.

First experiences showed difficulties related to the financing. Namely, the financial world was not yet accustomed to the concept of societal profit, which lead to high interest rates and the need for a governmental organization to issue a warrant for the investment.

Within REFURB project duration the following results were reached:

- Number of Frisian villages that have gone through 'village journey': 2 (Harkema and Baard)
- Number of dwellings that have been taken into account as one group for financing: 11 dwellings first to gain valuable lessons, then other 80 dwellings.
- Number of Frisian energy cooperation for duplication: 51

3.5 ONLINE CUSTOMER TOOL AND APPROACH (MIJN ENERGIEKOMPAS)

The delivery of the “compelling offer” to homeowners is to be done, among others, by online tools. Within the REFURB project a tool ‘My Energy Compass’ (Mijn Energie Kompas in its original name in Dutch) was developed. It should be stated that since already many tools supporting energy renovation exist, the REFURB participating partner countries agreed to screen the locally to them available tools. This was done with the purpose of establishing the state of the tools, their functionality and placement throughout the customer journey.

The general outcome of the analysis of the existing tools was that the tool situation in the partner countries is good. Descriptive tools in all countries seem to be numerous, they are typically well designed and user friendly. Despite that, it was noticed that the great number of tools in each country might overwhelm homeowners and cause difficulty in finding the right one. Therefore, as remedy to the situation the partners suggested a government-managed overview of the tools.

With respect to calculation tools, the situation seems to be different in each country. While there was variety of tools, the level of information required to perform a meaningful calculation varied greatly.

To sum up, the initial stages of the customer journey are well covered by tools and provide fast numbers and "ballpark estimates; although, such calculations are not enough to offer a tailored solution for deep energy renovation.

REFURB project developed an online tool and approach to ensure market uptake of renovation packages. The partner Leiedal created the tool 'My Energy Compass'. The tool is tailor-made for Leiedal's region, but the concept and design can inspire similar tools in other regions in Europe. The key concept behind the design of the tool is the model of the customer journey to renovation.

My Energy Compass is designed to convince homeowners to start with their customer journey to renovate their house and to nudge them to the other steps in the customer journey.

User-friendliness is a key feature of the tool. This is not only reflected in the language use but in other elements as well, such as:

- Front-end design: attractive design, icons and infographics
- Text descriptions: non-technical language and brief descriptions
- Back-end design: HTML 5, thus suitable for smartphones and tablets
- Output: a map with energy label for all dwellings in a region, renovation report in .pdf file.

My Energy Compass is a free and user-friendly on-line tool, which offers the homeowner three options:

1. Check on the energy performance of the dwelling
2. Discover on how to improve the energy performance
3. Get help with the renovation of the dwelling

The tool focusses on single houses. Apartments are excluded, as they need a different calculation method and underlying assumptions. However, the methodology of My Energy Compass can be duplicated for apartments.

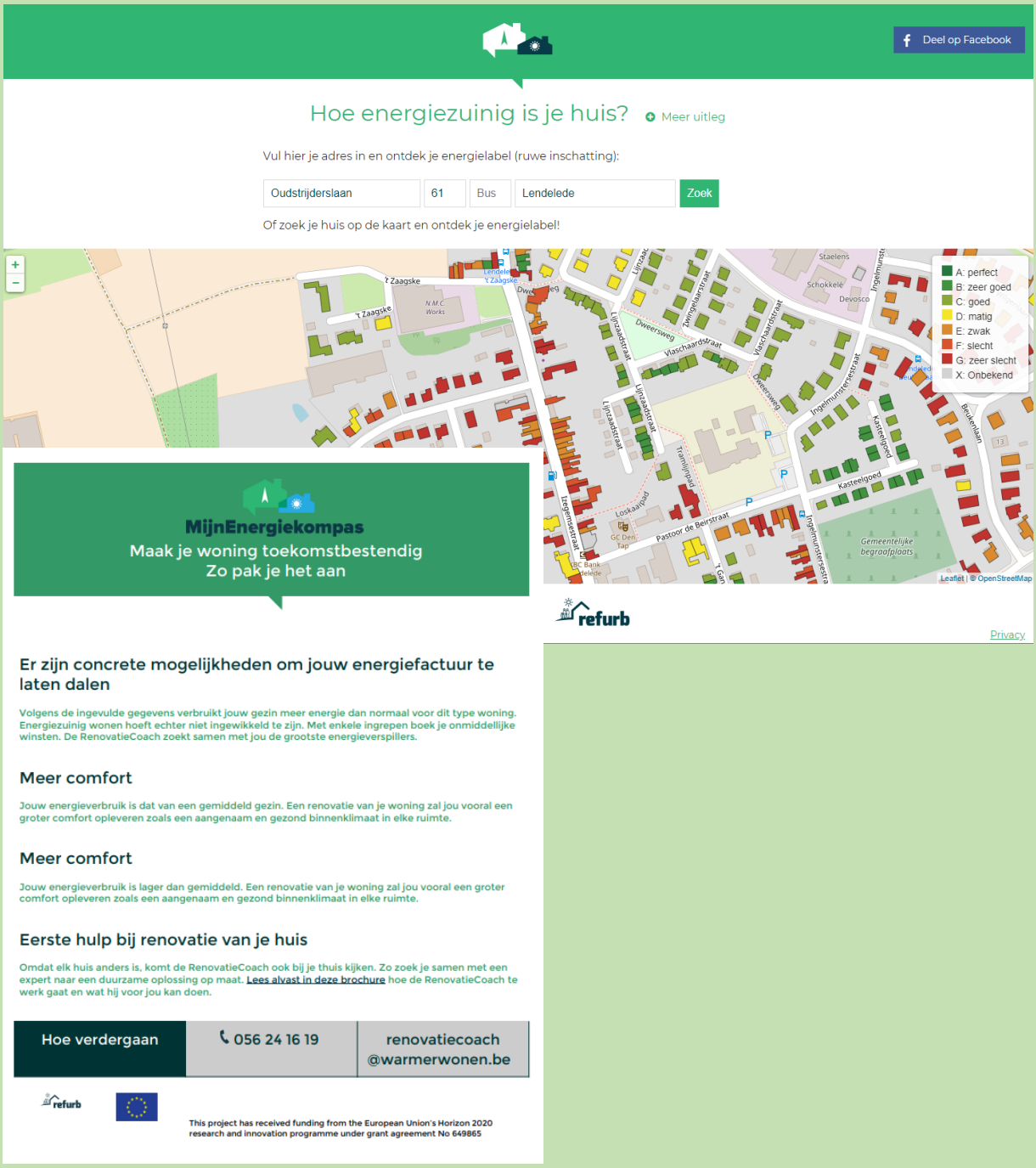
Taking these items into account, the tool can be easily applied in other regions in Europe.

Conclusions

- There is a substantial number of both descriptive and calculation tools already developed and available for the demand side of the renovation process in many EU countries.
- From the tools review, the conclusion is that tools are generally advanced, informative and of high quality. Main drawback of the existing tools is that they are most often too overwhelming to ordinary house owner. They are often too big, too informative, too professional and, therefore might scare and discourage house owners from the energy renovation.
- Developed tools for the demand side of the renovation process (house owners) should be:
    - User friendly

    - Have appealing, intuitive and transparent interface
    - Should be easy to follow (it should be easy to fill in information)
    - Should not be too detailed and not require too much time spent.
    - Should give clear und understandable to house owner indication of what is the current state of the building and where is the priority for the renovation
- The geographical scope of tool developed in the Refurb is currently limited to Leiedal's region, however, expansion to the whole region of Flanders is possible when the corresponding EPC- and GIS-data is acquired. Moreover, tool can be rolled out into other regions in Europe using the methodology developed while creating 'My Energy Compass' and taking into account local conditions.
- The greatest potential for online tools as My Energy Compass is when used as a part of a wider strategy or programme. In Refurb, such strategy was called customer journey. When complemented with other tools or services that link to other steps in the customer journey, synergies could be achieved and it is believed that entire renovation process has higher potential for the success and completion and by that number of drop outs would be decreased.
- It is concluded that online tools potential to support customers in their renovation journey is especially high with respect to the first steps: becoming aware, becoming interested, becoming active and considering the offer. These are also the essential steps to get house owners "on board" and trigger their urge to renovate. It is advised that further steps of the journey are supported by Renovation Coach service that would guide house owner through technical and financial aspects of the journey. Such option optimally could be supported by another similar online tool or service for the next steps in the customer journey, for instance focusing on selecting suppliers, calculating financing options, providing support during installation and payment of the construction works. However, it would be expected that these tools would be handled by the professional Renovation Coaches and therefore would allow more detailed input and output interface.

Mijn Energiekompas www.mijnenergiekompas.be

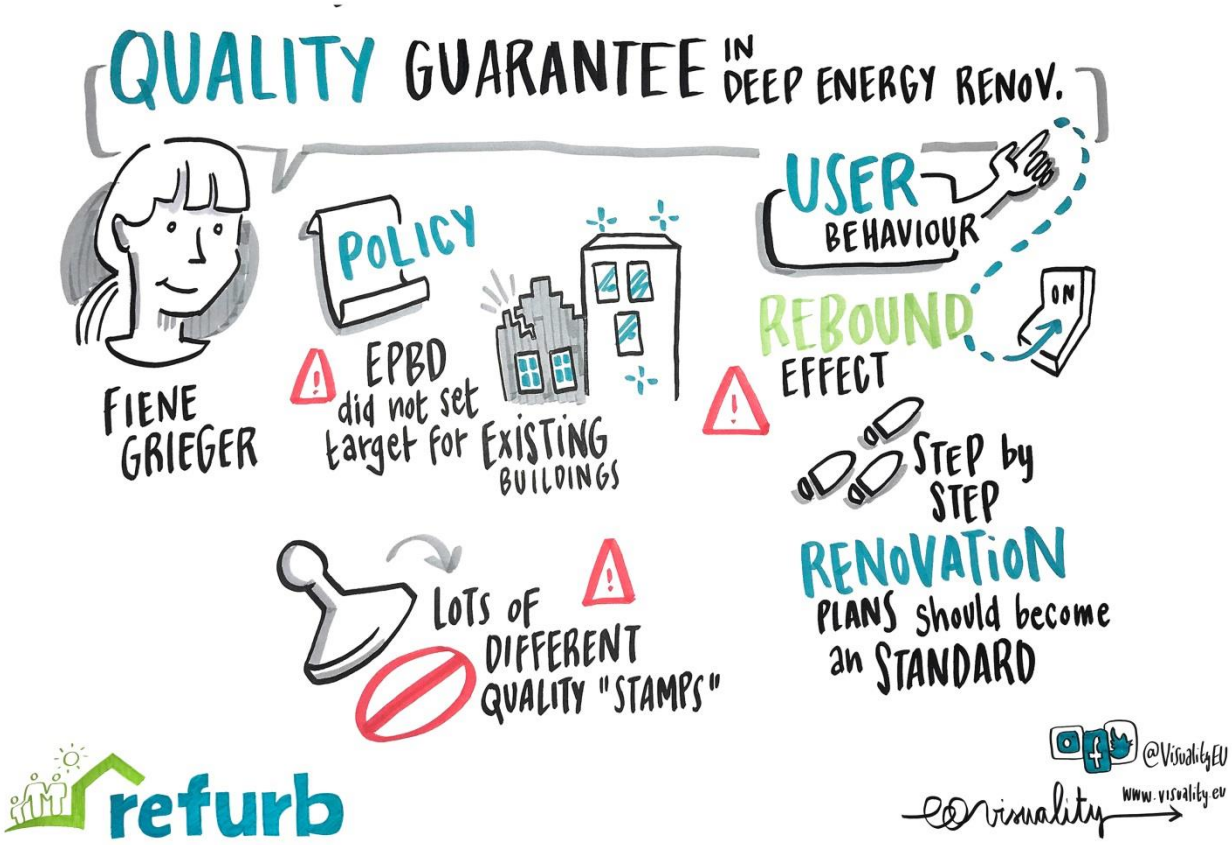


MijnEnergiekompas.be fills in a crucial information gap that homeowners meet: they lack information on the energy performance of their dwelling that is free and tailor made. Based on big data, homeowners get a rough estimate on their energy label. After running through a questionnaire, homeowners get an improved estimate of the EPC-label, plus a tailormade advice for NZEB-renovation. MijnEnergikompas.be calls to action, and proposes the next actions to take to start to renovate, with the services of the renovation coach. The tool was fully developed by Leiedal within the REFURB-project and covers the first

3 stages of the customer journey: activating more homeowners to start to renovate. It is an essential part of the renovation package (one stop shop), the regional renovation program "Warmer Wonen"

One year after the launch in March 2017 (in presence of the Flemish Minister of Energy) there were already 2.500+ unique visitors, and 1.000+ tailor made NZEB-renovation reports were generated. Many business leads to the RenovationCoach came from MijnEnergiekompas.be. Other cities and regions within and outside Flanders are interested to adopt the approach of Leiedal, including the tool.

3.6 Quality Assurance Approach



Quality assurance in nZEB home renovations requires attention throughout the entire renovation process, from the early stages until hand-over and further on during the use phase, from all involved parties. **REFURB project found out that quality assurance for home renovations is handled differently per country depending on the market situation.** While certification of the supply side is imposed in the majority of them, performance guarantees are neither legally implemented nor found in practice in general.

Only in the Netherlands, energy performance guarantees are offered in a system set up together with the government and the supply side. The Nul Op de Meter (NOP) Keur, created within Stroomversnelling (the Dutch continuation of Energiesprong) guarantees energy performance for zero energy dwellings (= no energy

bill, the house produces its own energy = EPC = -0,42). Housing corporations in the Netherlands receive an EPV (= 'Energie Prestatie Vergoeding) compensation based on the number of achieved 'energy label jumps'. The key of success of this system is that the supply side was involved in the setting up.

Some loans or financial incentives for energy renovation are linked to the quality of the works or the energy performance of the building afterwards (e.g. KfW funding for 'Effizienzhaus'). Nevertheless, there is no guarantee to actually achieve energy savings to the expected extent, because they are usually based on the EPC calculations instead of on the real savings. It is well known, that the EPC calculations are not reliable when it comes to energy consumption, because they are mostly based on theoretical values and are therefore not accurate to estimate real savings.

When giving performance guarantees on energy savings of homeowners, risks might arise for the supply side due to the **rebound effect**. No supplier can give a real guarantee for the dwellers' behaviour. Smaller companies may particularly suffer when different contractors work together. They will be responsible for their products but not for the performance of the final system. Only in highly comparable buildings of a certain type, which are equipped with a predefined package solution on a large scale, a generously calculated performance guarantee might be an option for the supply side and provide benefits for the homeowner. However, there is a need for monitoring after the works are finalized, in order to ensure actual energy savings.

There is still a need for stronger collaboration and trust building between 'traditional' partners such as contractors, designers and consultants. In addition, collaboration is recommended with new types of stakeholders such as renovation advisors, project managers, ESCO's, renovation stores, one-stop-shops, and non-profit organisations. Therefore, **the single-point-of-contact revealed highly relevant for market uptake**.

The renovation process is based on a **trust relationship** between the consumer and the supply side. The way a performance guarantee is offered to the homeowner in the current market setup may undermine this needed trust. Nevertheless, it might be appropriate to give guarantees on an average performance of a number of buildings e.g. street level, not at individual building level. One could guarantee a minimal energy saving combined with a (wide) range based on the current energy use of the homeowner; this is measured via monitoring.

Benchmarking the homeowner's energy use with that of similar households and confronting him/her with it (with smart meter and some type of screen), is much more stimulating for them to take up energy saving actions than any kind of energy saving guarantee or 'cold' calculations on the return on investment could be.

In order to achieve the ultimate goal to reduce energy consumption, the main challenge is to **create customer confidence**[21], getting homeowners on board of a customer journey towards nZEB and keeping them until completion.

Within the REFURB project, it was found that performance guarantees are neither a trigger for homeowners to complete their nZEB renovation nor a major barrier in entering the customer journey. However, this does not mean that quality issues should be neglected or that actions should not be put in place in order to achieve the expected energy savings. It is rather an appeal for a **holistic quality approach:** the entire customer journey should have quality checks and balances built in.

[21] See COHERENO (Collaboration for housing nearly zero-energy renovation) report on creating customer confidence through quality assurance - http://www.cohereno.eu/fileadmin/media/Dateien/Cohereno-report-customer-confidence.pdf.

REFURB also found out that **quality assurance can be embedded in different ways in the compelling offers for nZEB renovation services.** This is done in a way to complement performance guarantees of energy savings (as the prerequisite for customer-confidence), with improving the customer relationship by providing guidance along the entire customer journey (CJ). Also, through building customer confidence by using a toolbox of quality assurance measures and illustrating the potential added value of a **Single Point of Contact as a facilitator for nZEB renovations**.

Quality assurance should be interpreted as a feature of the compelling offers to create and contribute to customer confidence and not as a goal in its own right. As such, quality assurance can take the form of a toolbox of quality assurance measures embedded in the compelling offers[22]. Which kind of measures and under which conditions etc. must be tailored to the composition and the local context of the compelling offer. Including guarantees for energy savings is one way to create customer confidence, but there are a lot of other options possible that can achieve the desired result.

Quality assurance measures can also apply to the demand-side, as the aim is to ensure a good customer experience of the NZEB renovation. For instance, quality assurance and performance standards for technical installations will not achieve the desired result when not maintained or used properly by the consumers.

3.7 SINGLE POINT OF CONTACT (SPOC)

The renovation process is based on a trust relationship between the consumer and the supply side**. In one-stop-shops, the SPoC builds a trust relationship with the customer during the complete customer journey.** The main challenge is to create customer confidence to get homeowners on board throughout the entire (11 steps) of a customer journey towards nZEB home renovation.

Within REFURB, in a first step, best-practices of SPoC were identified and analyzed. In a second step, the key competences of SPoCs of existing best-practices one-stop-shops (OSSO) were compiled. When looking at the competence profile per steps of the CJ for existing OSSOs, overall one can conclude that the blueprint of the SPoC as analyzed per CJ step is:

- **Knowledge**: Knowledge on target groups, knowledge on product to sell, knowledge on (alternative) financial solutions, basic knowledge of human psychology on how people decide and why they doubt, knowledge and experience in the building sector, knowledge on post renovation issues;
- **Skills**: Communication skills, sales skills, social skills, networking skills, negotiation skills, technical skills, quick- problem solving skills, coordination and follow- up skills, marketing skills;
- **Attitude**: Pro- active, positive, devoted, reliable, convincing, patient and with a supportive mindset towards homeowners/ customers.

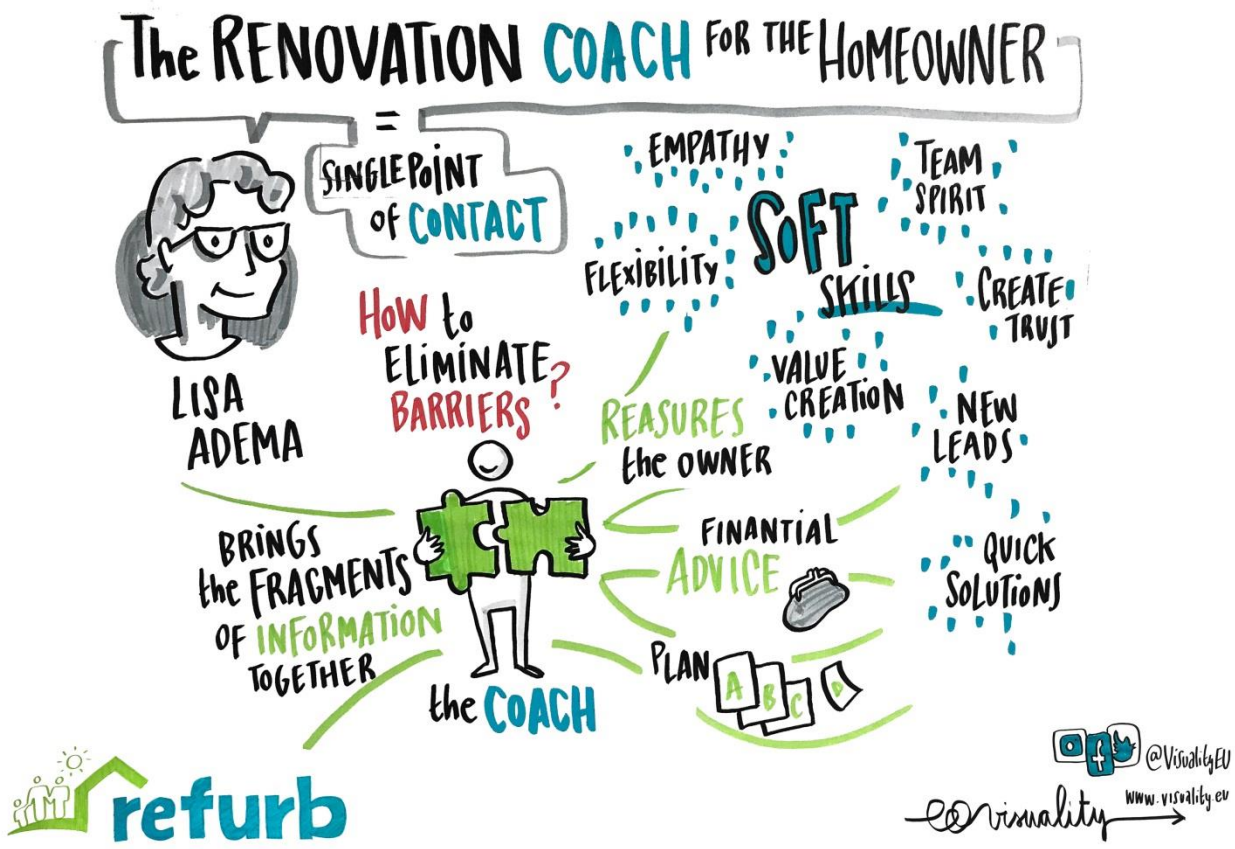
In general, to avoid dropout along the steps of the CJ, the SPoC would benefit from (additional) training in:

- **Knowledge**: Knowledge of target groups (including drivers and barriers of homeowners to renovate), knowledge of (alternative) financial solutions, broad knowledge on nZEB/ technical side of the product, subsidy schemes and financial incentives;
- **Skills**: (Multi- channel) communication skills, marketing skills (especially, the effective use of social media and tailored marketing plans), networking skills, public relations, how to differentiate in male/

[22] COHERENO (2014) Hands-on recommendations on Quality Assurance and Customer Confidence for NZEB renovations

female value creation, collaboration, rhetoric training, customer relations, negotiation skills, how to guide and analyse customers' needs to 'translate' technical details for a non- expert, sales skills (exposure of good examples in the press and social media, create and keep active leads, create trust), quick problem solving, techniques to gain confidence, techniques to convince homeowner, training how to create and keep trust, organizational skills, broad spectrum of technical skills on renovation and nZEB- issues, quality management;

- **Attitude**: Pro- active with follow- up.



An EXAMPLE of a trust-person and single point of contact for homeowners during the deep renovation process: NZEB (Nearly Zero Energy Building-renovation) coach

Figure 11 The model renovation in Kuurne

Figure 12 The renovation coach

Resulting from the REFURB project activities, a Nearly Zero Energy Building-renovation Coach was established that supports homeowners throughout the entire renovation process of their house. The main goal of the nZEB-Coach is to encourage homeowners to carry out deep renovations and to unburden them as much as possible during the renovation process.

The nZEB-Coach makes a technical-energy analysis of the property and advises the homeowner about the work to be done and about the collaboration with building professionals. He or she is the trust person for the homeowner, the point of contact when making decisions about the work or to support the homeowner applying for subsidies, loans, ... In addition, the NZEB-coach collaborates with supply side actors and local stakeholders such as public bodies, housing associations etc.

A full communication strategy was developed to promote and introduce the concept of the renovation coach with homeowners. Main features of this communication strategy are:

- Logo and dedicated style
- Printed media (folder, leaflet...), distributed via e.g. cities and municipalities
- Social media and digital communication (Facebook, website, films on the offer of the renovation coach)
- Regular media (communication via regional TV, press articles, decals on the rear of public busses...)
- Demonstration of examples (model-renovation, posters on the renovated house, etc.)
- Caravan & events (presence in neighborhoods, on fairs, etc.)

renovation coach manages a dedicated Facebook-page, on which he regularly puts posts (a few posts per month). On this page, he can communicate directly to (potential) customers. During a sponsored campaign (Sept 2017 - Jan 2018), 42.602 people were reached (50/50 male/female), and 449 likes were collected.

The homeowner is unburdened via the renovation coach as he can offer a variable package of services, depending on the demands and needs of the homeowner:

- Advice when buying a dwelling
- Advice on subsidies and green loans
- Leading to skilled partners of the building sector
- Follow-up of renovation works
- Calculation and maximization of the energy savings
- Independent advice, tailor made to the own situation

The REFURB partner Leiedal has recruited a nZEB-Coach in 2017 (a second will be hired in 2018) and has offered this service for the municipalities in their region. Leiedal's NZEB-Coach is part of Leiedal's one stop shop Warmer Wonen[23] and is linked to the online-tool Mijn Energiekompas[24]. The service has contributed to a network of NZEB-coaches established by DSOs Eandis and Infrax in the whole region of Flanders.

Further reading
https://www.facebook.com/RenovatieCoach/ (Dutch)
http://www.warmerwonen.be/de-renovatiecoach

4 Local Roll-out & Transferability Examples

4.1 PILOT TEST AND APPROACH

In order to facilitate widespread application of the REFURB solutions, it was important to first test the solution within the regions of the project partners. Therefore, each participating country carried out a **pilot test** in collaboration with regional partners to create, test and improve the compelling offers for deep energy renovation for their target segment(s).

In many cases, the pilot was **embedded in local / regional renovation programs**. The regions selected focus groups of local stakeholders (including homeowners) to participate in the pilot. For this, a communication and recruitment strategy were developed. The **focus groups** consisted of relevant stakeholders, matching the selected segments, for example young families, empty nesters or residents from multi apartments.

During the focus groups meetings, the main feedback was gathered from the relevant stakeholders. If needed, the compelling offers were adapted based on feedback received. In addition, with the feedback received some recommendations for further development and market uptake of the compelling offers were compiled. The main goal of organizing focus groups was to share knowledge and to collect practical experience from both demand side (e.g. homeowners) as supply side actors (e.g. installers). Insights and lessons learned gathered during the focus groups were used to optimize the compelling offers accordingly. If needed, additional feedback-and-development-cycles were introduced.

[23] http://www.warmerwonen.be/
[24] https://www.mijnenergiekompas.be

In addition, for some dwellings, the before and after energy performance was validated by an independent EPC expert. Comparing the EPC before and after the renovation for housing projects where a renovation package is implemented are an **objective and impartial quality check** to indicate the effectiveness of the compelling offers and the renovation packages.

But equally or even more valuable than quantified results were the **discussions and networking** opportunities during the focus groups meetings itself. They created a basis for social acceptance among the involved stakeholders, strengthening the local network and increasing the chance of market-uptake on a local scale. Homeowners were able to interact with installers, local decision-makers and vice versa.

Pilot test

In the pilot tests conducted in the municipality of Leeuwarden, a two-step approach was followed:

1. Set up the focus group
2. Collect and integrate feedback

The experience from The Netherlands but also from other cases in Belgium, Denmark, Estonia, Germany and Slovenia is shared in the REFURB deliverable report 'D6.1 – Pilot tests and improvements', which is publicly available for download on REFURB's website[25].

Step 1. Set up the focus group.

From the municipal network, groups of people with similar interest found each other (for instance: very active neighbourhoods in Leeuwarden, villages, frontrunners, ambassadors) and together formed focus groups to discuss their wishes/ needs, current one-stop- shop offers and propositions for deep energy renovation. The municipality has facilitated this process, gathered all their experiences and remarks and steered actively towards the execution of (pilot) projects. The large municipal extended focus group is an 'ongoing work in progress', with new stakeholders being added to the mix on a regular basis.

Within focus groups it was first and foremost important that demand side (homeowners) and the supply side (installers, building firms/ contractors) could speak the same language and understand each other's point of view. There was a constant pragmatic sharing of ideas and experiences. What works? What does not work? All with a constant emphasis on accelerating deep energy renovation. The municipality was actively involved to bridge the gap between demand and supply and to work towards a(NZEB) solution that would appeal to all the homeowners within a neighbourhood.

Step 2. Ask the focus group to give feedback over the prototype renovation concepts.

Within its role as facilitator/ stimulator, the municipality of Leeuwarden has learned important lessons from its focus groups to reinforce the compelling offer. Feedback related specifically at the innovative compelling offers is been given. The compelling offers are all still 'ongoing', but as they are innovative offers obviously some changes have been made along the way, based on lessons learned.

Based on experiences within the network and focus groups:

- It is very important for a government to invest in a solid and consequent approach for the first four crucial steps of the customer journey, starting by spreading the message on the importance and benefits of energy saving (in short, **the information phase).** It is a very lengthy and intense process of targeted communication and marketing, but over time things fall into place and then the invest will surely proof to be very fruitful. The neighbourhood of Aldlân is living proof of that;

[25] http://go-refurb.eu/wp-content/uploads/2018/03/649865-REFURB-D6.1_pilot-test-and-improvement.pdf

- **A stimulating and facilitating municipal government** can help to create 'synergy' within the boundaries of the municipality (the demand side) as well as the market for deep energy renovations (the supply side). Keeping an open dialogue with homeowners and stakeholders is key;
- It is good to have **compelling offers that differ a lot from each other**. Opting to stimulate and promote multiple and diverse types of compelling offers and approaches, enhances the level of success as it will increase the change that (certain aspects of) either one of them will appeal to a wide range of residents.

Success story – Aldlân neighbourhood renovation

One neighbourhood, two compelling offers

One neighbourhood where lots of REFURB lessons learned have come together! In Aldlân the municipality of Leeuwarden has started its WENK project. WENK is Dutch for Wijkaanpak Energie renovatie koopwoningen, or in English: A neighbourhood itself, whom has decided on deep energy renovation. They receive professional process guidance from Procap. The neighborhood of Aldlân is an active neighborhood with lots of frontrunners on energy saving among its inhabitants. What is more, the neighborhood has also set itself a goal to become the greenest neighbourhood in 2020, with a strong focus on deep energy renovation of the existing dwellings. Phasing out the use of natural gas is an important aspect.

Huiseigenaren Aldlân gaan voor energieneutraal

Stichting Duurzaam Aldlân presenteert haar plannen eind 2017 aan de rest van het projectteam.

Als het aan de huiseigenaren in de Leeuwardense wijk Aldlân ligt hoort het gebruik van aardgas en grijze stroom binnenkort tot de verleden tijd. Daarvoor zijn energierenovaties met energiebesparende maatregelen en duurzame technieken nodig. Geld om dat te realiseren is er vaak niet. Het houdt de huiseigenaren niet tegen om samen met lokale partijen aan een oplossing te werken. De eerste energieneutrale renovatie staat gepland in het voorjaar van 2018.

Europese uitdaging

refurb

Vanuit het traject WENK-Aldlân (Wijk Energie Neutraal Koopwoningen) werkten inwoners, lokale bedrijven, de gemeente Leeuwarden en een adviesbureau het afgelopen jaar samen aan deze uitdaging. Huizen energieneutraal renoveren en geen energierekening meer. Een uitdaging die zowel landelijk als Europees nog als enorme uitdaging wordt beschouwd. Binnen het Europese innovatietraject "REFURB" staat deze uitdaging centraal. Gemeente Leeuwarden werkt hierbij samen met partners uit verschillende Europese landen om te zoeken naar innovatieve wijzen voor het grootschalig verduurzamen van de particuliere woningvoorraad.

Samenwerking

Met behulp van lokale bedrijven, de gemeente Leeuwarden en kennispartner SBRCURnet werd de unieke samenwerking in de wijk Aldlân in het afgelopen jaar tot stand gebracht. Duurzaam Aldlân, Jorritsma Bouw, P. de Vries Installatietechniek, Bouwend Nederland, de vereniging SLIM Wonen met Energie en adviesbureau Procap bedachten samen de invulling van het heldere uitgangspunt: een kosteloze energierenovatie. Johan Duut, adviseur bij Procap: "Het is behoorlijk uniek dat een aannemer, installateur en andere partijen samen met huiseigenaren aan deze uitdaging werken en samen oplossingen ontwikkelen die specifiek passen bij de woningen in de wijk. En allemaal even gemotiveerd; iedereen gelooft dat het kan. Want waarom zou je je geld nog aan een energieleverancier besteden, terwijl je voor hetzelfde geld in een energieneutraal huis woont, meer comfort hebt en je huis meer waard is?"

Hoog energieverbruik

Wim de Vries, voorzitter van Stichting Duurzaam Aldlân: "Veel van de jaren '70 huizen zijn nog niet of deels gerenoveerd, maar zijn daar wel hard aan toe. Bewoners hebben last van tocht en een hoog energieverbruik. Daarom hebben ze ook een hoge energierekening. Het belang om samen duurzame oplossingen voor renovatie te vinden is daarom groot. De huidige energierekening willen we omzetten naar een duurzame lening waarmee de renovaties kunnen worden gefinancierd."

Volgende stap

Het consortium is klaar voor de volgende stap. Het bedachte eindproduct, de energieneutrale woning, moet toepasbaar worden gemaakt voor de meerdere woningtypes en verschillende huizen in de wijk. De Vries: "Voor iedereen is een energierenovatie anders. In feite is elk huis door kleine aanpassingen door de jaren heen anders geworden, ondanks dat veel woningen in de basis gelijk zijn. Daarom willen we er voor zorgen dat elke huiseigenaar vanuit zijn of haar persoonlijke woonsituatie aan kan haken op de weg naar een die energieneutrale woning. Als dat lukt, zijn we echt geslaagd en zet Aldlân snel de eerste stappen richting een vernieuwde en energieneutrale wijk."

Eerste energieneutrale renovatie

De gemeente Leeuwarden heeft Stichting Duurzaam Aldlân eind vorig jaar gevraagd om het vervolg van dit traject te trekken. "Ze beschikken binnen de stichting over een brede expertise en ze zijn vanuit hun kijk op de praktijk al vaak richtinggevend geweest binnen het proces. Het is een unieke kans om dit traject nu van-onder-op verder uit te werken," aldus Arjen Goodijk van de gemeente Leeuwarden. Inmiddels hebben diverse interessante partijen aangegeven bij te willen dragen aan dit traject. Binnenkort stelt Stichting Duurzaam Aldlân de inschrijving open voor geïnteresseerde huiseigenaren.

Figure 13 'Huiseigenaren Aldlân gaan voor energieneutraal' – Item in the local newspaper Huis aan Huis (dd. 24/01/2018

A consortium of stakeholders, including homeowners, a building company, an installer and intermediaries, has been working together as a focus group to work towards a compelling offer for the neighborhood. The municipality (Slim Wonen in Leeuwarden) has been facilitating in the process, bridging the gap between demand and supply. Buurkracht has also been involved. In addition, a professional process facilitator was hired for this neighbourhood approach to deep renovation of private residential dwellings.

Figure 14 Consortium of stakeholders as focusgroup

This 'Aldlân neighborhood compelling offer' was finalized at the end of 2017/ beginning of 2018. The first pilot dwelling will be renovated in 2018.

Besides from this neighborhood compelling offer, there has recently been another development within Aldlân. REFURB compelling offer # 2 (modular approach to NZEB; see D4.4) has also been welcomed as a compelling offer by the neighborhood. In 2018, a block of 8 dwellings will be renovated to NZEB with REFURB compelling offer # 2 by means of a pilot project.

Once the pilots are successfully completed, a neighborhood rollout is expected for both. The inhabitants/ homeowners of the neighborhood of Aldlân can decide for themselves which compelling offer they find most attractive. Moreover, a roadmap for the neighborhood (towards 2050) and a solid financial solution for all will be developed. The financial solution will likely be a form of 'building related financing', being a type of ESCO structure. Experiences from the compelling offer 'Village ESCO' (see above) can prove useful for Aldlân as well.

Thanks to REFURB, the municipality of Leeuwarden has:

- **Recognized the potential of the neighborhood** wishes concerning energy saving/ energy renovation. This has led to the decision to keep investing in the process, keep it going;
- Maintain a **strong consortium/ focus group**. The focus group included also intermediaries as catalyst in the process; Buurkracht, Slim Wonen in Leeuwarden and by hiring a professional process facilitator;
- This has led to the evolution of neighborhood approach energy saving (such as Buurkracht, Slim Wonen in Leeuwarden) towards a **full- blown neighbourhood compelling offer for nZEB renovation**. The first pilot dwelling will be ready in 2018 and this will lead to more renovations in the near future;
- Thanks to the earlier 'neighbourhood CJ' that has taken place here, the neighbourhood of Aldlân now has a choice between **two compelling offers**! A pilot project for REFURB compelling offer # 2 (with the industrial Stroomversnelling approach) will also take place here in 2018.

Results
Two compelling offers have been taken up by private homeowners in the neighbourhood of Aldlân. After successful completion of the pilot projects scheduled in 2018, the rollout of both compelling offers can be expected.

Further reading
Local communication and social media channels:

- http://duurzaamaldlan.nl/?page_id=122
- https://www.buurkracht.nl/buurten/aldlan
- https://www.facebook.com/duurzaamaldlan/

REFURB deliverable reports:

- D6.1 Pilot test and improvements
- D6.2 Roll-out

4.2 ROLL-OUT AND TRANSFERABILITY

A roll-out plan was composed that describes how widespread uptake of the solution developed in REFURB can be implemented in other regions and cities. The plan focussed on private homeowners throughout Europe and describes concrete actions that have to be taken-up. The roll-out strategy will consist of three different phases:

- Phase 1. Implementation of legislation (where needed) and creating general awareness and support in government and industry.
- Phase 2. Ensuring the building industry is ready.
- Phase 3. Making them an offer they can't refuse (the consumer acts), which is preceded by the local pilots in order to validate and demonstrate these compelling offers.

The roll-out strategy was based on the core elements of the REFURB project: the REFURB segmentation method; the REFURB Customer Journey; and the REFURB compelling offers.

The generic approach with its three phases were translated to a bottom-up "local to national" cycle, with 3-steps:

1) The municipality in cooperation with local actors in private- public partnership is implementing necessary actions to initiate and secure a local functioning customer journey;
2) Combined with stronger engagement of national stakeholders;
3) Securing national government improving incentives and promotion of energy retrofit at national level based on the REFURB approach. Stronger national support will potentially attract more municipalities and help scale up the REFURB concept to other regions and municipalities.

The local approach is the starting point, because the local stakeholders as municipalities and local Public Private Partnerships are close to the homeowners and it is here, that trust and commitment can be created for both the municipality and local craftsmen.

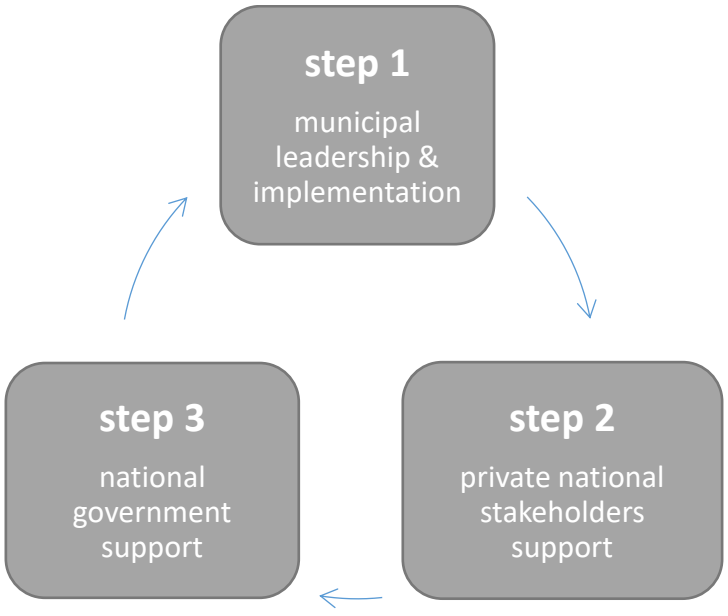


Figure 15 Rollout approach

The model below provides a good overview of how the 3-step integration strategy (horizontal) is working hand in hand with the REFURB Customer Journey (3 vertical phases).

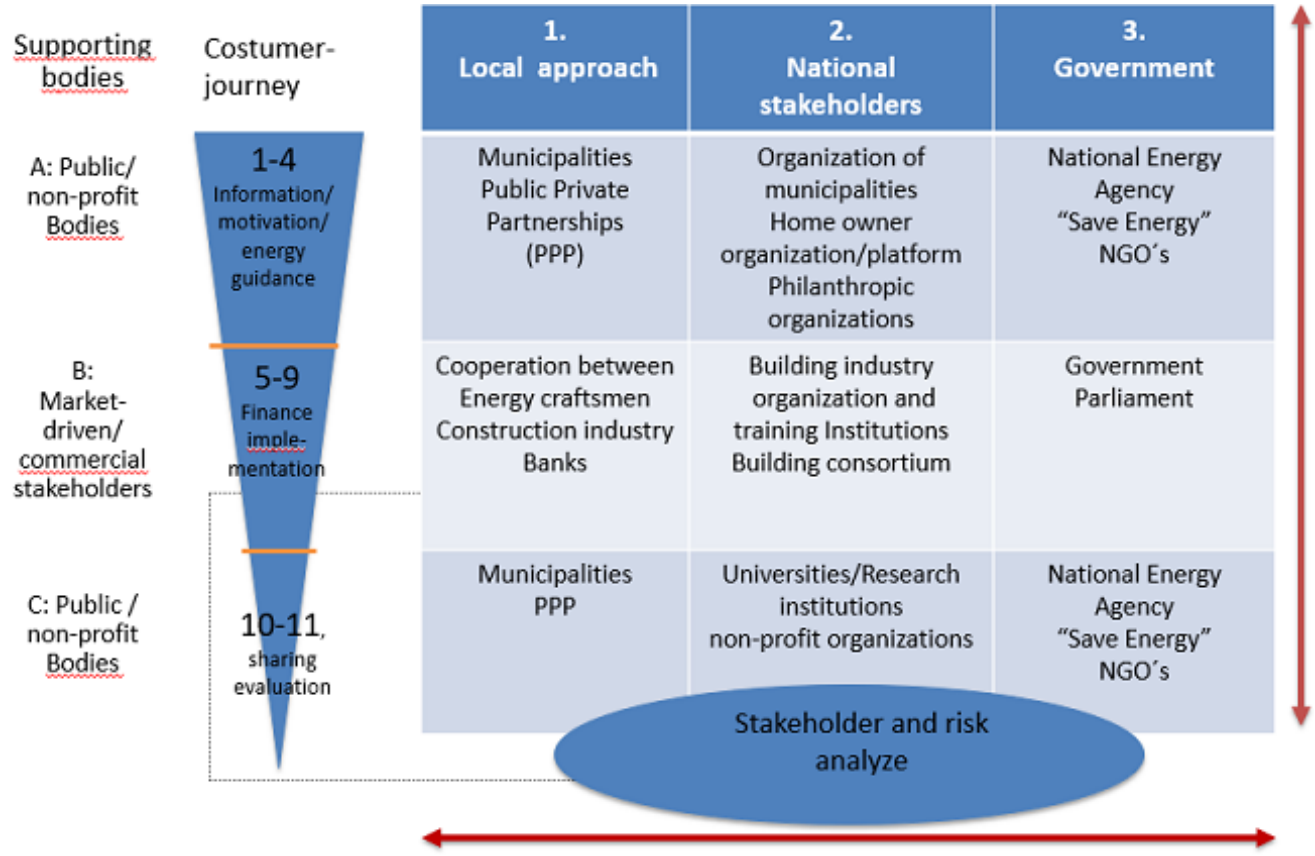


Figure 16 Roll-out plan

Detailed description of the REFURB solutions roll-out can be found at: http://go-refurb.eu/wp-content/uploads/2017/10/REFURB_D6_2_rollout_plan.pdf

Example - Public Private Partnership, Fryske Deal
Building firms, housing corporations and municipalities commit to renovate 3.000 dwellings to NZEB

The social housing segment in the Netherlands is relatively large as compared to other European countries, with consistent types of building typologies. Deep energy renovation of social housing has been targeted within the Stroomversnelling (Energiesprong) for years, triggering a lot of impact, innovations and many lessons learned.

Despite of the success of the Stroomversnelling, nZEB renovation in the private residential sector was also lagging in the Netherlands and Fryslân just as much as in the rest of Europe.

To further help boost the Frisian NZEB market, an ambitious plan to renovate 3000 social housing dwellings in Fryslân was coined in 2017. The plan is an example of a private- public partnership, supported by a consortium of stakeholders: four municipalities, province of Fryslân, three large regional building companies, two social housing corporations and several intermediaries (including Stroomversnelling). The plan was the first concrete agreement made in light of the Frisian Energy strategy.

The nZEB solution and lessons learned from the Fryske Deal can be transferred and scaled- up to national level within the Stroomversnelling.

Further reading (both in Dutch)
http://regionale-energiestrategie.nl/met-de-fryske-deal-3-000-woningen-energieneutraal-maken/
https://www.youtube.com/watch?v=39G1cmxFNzQ

4.2.1 The Danish roll-out strategy

Step 1 – Municipal leadership and implementation

Several Danish municipalities have in the last 5-8 years created their own approaches to motivate homeowners to energy retrofit their homes. Main motivational driver has been to engage citizens in the city transformation journey but phasing out old oil-burners and supporting the local job creation have also been important drivers. These attempts all serve as important local learning platforms for adaption of the REFURB approach as a new common platform.

Step 1 built on engaging the following network of towns:

1. **The Danish Energy Towns**: 7 Danish ambitious municipalities including Sonderborg have lately formed the Danish Energy Town alliance. The network ambition is to share and scale up best practices and experiences among the network towns.

2. **The Homeplan towns:** 5 innovative Danish towns have with support from Realdania[26] recently launched the Homeplan initiative that focuses on the way Danish towns can deploy the use of BigData in targeting and reaching out to homeowners for giving individual digital advices for energy retrofit. The ambition is to launch a second round with additional 5 new towns lead by Clean Green Business Growth by the end of 2018. The Homeplan therefore creates a platform of 10 municipalities, however two of them, Middelfart and Høje-Taastrup, are already participating in the Danish Energy Towns network.

The rollout ambition is to use the mentioned network of towns with all together 15 leading and innovative Danish towns as operating platforms for scaling up the REFURB concept during 2018/19.

[26] Realdania is a philanthropic fund and change agent with a mission to improve the quality of life and benefit the common good by improving the built environment.http://www.realdania.org/whatwedo

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Step 2 – Private national stakeholders support

The step 2 stakeholder will support and accelerate the already taken step 1 initiatives.

The BetterHome Company is a supply-driven national key actor within energy retrofit of private homes. Established by the four Danish leading companies within green energy solutions: Danfoss, Grundfos, Velux and Rockwool. The BetterHome Company has been disseminating for several years that there is a retrofit engagement role for the private sector across Denmark, especially when it comes to deep renovations in the major towns. In 2017, 300 houses have been retrofitted by means of a deep energy renovation with an investment per home of approximately EUR 70,000.

The BetterHome concept has a good insight in filling out the commercial part in the implementation of a retrofit.

Step 3 – National government support

Considering a successful step 1 Municipal ramp-up, supported by the step 2 national stakeholders, step 3 will focus on what kind of national frame setting improvement initiatives need to be implemented to further scale up and accelerate the rollout of the REFURB approach in Denmark.

Core elements in step 3 will therefore be to address incentives for homeowners and supporting the local approach.

The DEA Danish Energy Agency and the regulations from the government will support the 11-step customer journey on the initial 3 important steps: giving information, inspiration, motivation and energy guidance. This initial inspiration will potentially motivate for the action/implementation step 5-8 (driven by private market) and the additional step 10-11, where national government can support the dissemination of good examples and inspire for a second homeowner iteration of the Customer Journey.

4.3 TRANSFERABILITY PLAN

The REFURB project's focus was on privately owned dwellings and resulting in a transferability plan for the rental sector, i.e. how REFURB compelling offers could be adapted to fit the rental sector. However, due to their characteristics, some REFURB countries (DE, NL) composed compelling offers for or stemming from lessons learned within segments other than the private residential sector. Lessons learned in Germany and the Netherlands can be related to and are recognizable as such and might benefit transfer of compelling offers to other EU regions and countries with (large) social housing stock. Therefore, these lessons learned were used to compile a generic transferability plan for widespread uptake of the REFURB approach. In addition, other segments besides from the residential sector are targeted for transfer such as office spaces, schools and more.

For Germany, the compelling offer was based on the segment 'tenants of multi-apartment-dwellings' from the beginning, meaning mainly housing companies, especially housing cooperatives. From this perspective, the company or cooperative is the *owner* of the building, while the tenants, depending on the form of organisation of their landlord, might have certain rights of determination, but are mainly bound to the decisions of the owner.

For the Dutch REFURB compelling offer #2 'Modular approach to NOM' stems from the industrial approach developed within the Stroomversnelling (Energiesprong). A large regional building company already renovates social rental dwellings in Northern part of the Netherlands (mainly Leeuwarden/ Fryslân) with its own Stroomversnelling alike NZEB solution and now seeks to target the residential sector as well. Hence the Dutch REFURB compelling offer #2 'Modular approach to NOM'. In the Netherlands, the concept was actually transferred from the rental sector to private housing and the compelling offers of NL have to be interpreted this way.

The countries Slovenia, Estonia and Denmark were involved in a more integrated way, already trying to use the method for their customer segment (i.e. rental, multi-family)

Other partners already explored to transfer the approach (one stop shop, compelling offer, demand aggregation) to other sectors e.g. Buurkracht for Corporate communities[27] and Home owner associations.

Example - Transferability to other segments, schools Tartu (Estonia)

Potential target sectors for transfer in Estonia/ Tartu are:

- Buildings of education sector especially buildings of primary and secondary schools.
- Office buildings, especially those housing small and medium sized businesses and enterprises and mainly on rental basis.

CJ & single - point of contact
For educational buildings the CJ will be of less importance. Even more attention must be dedicated to technical consulting, considering the required complex renovations. As most of these buildings need to be repaired or renovated in coming years anyway it would be a good possibility to carry the renovation through up to nZEB level.

Technical package
Also differing from residential buildings, it is impossible to show financial gains from deep renovation. According to a study TREA commissioned from Tallinn Technical University, there is no possibility that renovating a school on any level would pay back in any length of time. The results of the study about economy of renovation of school buildings.
Three renovation packages were compared. As can be seen in the figure, if required ventilation without heat recovery is added to status quo then energy consumption doubles.

[27] Bedrijfkracht is essentially Buurkracht for business. So instead os saving energy with community neighbours, Bedrijfkracht aims at the community of colleagues within companies and organizations. More info on www.bedrijfkracht.nl

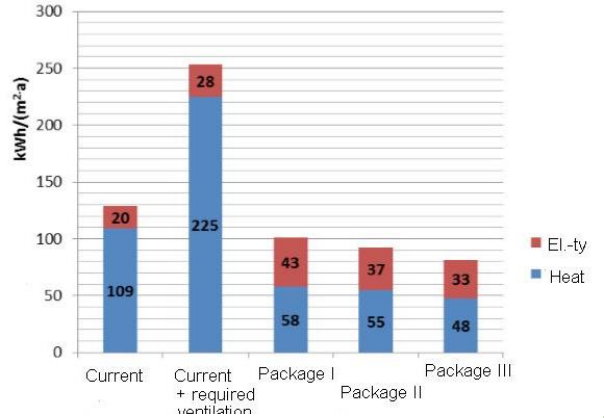


Figure 17 Energy consumption with different packages

Barriers

The main barrier is finding financing considering the excessive costs. It is feasible to use the same scheme as with residential multifamily houses where part of funding is based on one of emission trading schemes and channelled to beneficiaries through KredEx Fund.

Drivers

Unlike Housing Associations who do not possess capability for project management such as acting as a buyer for renovation work, schools themselves or respective city officials have adequate competence for acting as such. Based on TREAs experience though, there is still a need to manage and oversee specific aspects of energy efficiency.

Paradoxically the deeper the renovation the greater the cost. Thus, the reasoning for renovating schools needs to be based on different political decisions and the gains need to be shown elsewhere – quality of education, preserving cultural heritage, health of children etc,

5 Showcasing Regional Best Practices & Creating EU Wide Outreach

5.1 EU WIDE OUTREACH

5.1.1 Final Conference, 10th of October 2017, Brussels

The REFURB Conference [28]was held in Brussels (10th October 2017) in coordination with Renovate Europe Day 2017 during European week of Regions and Cities. It was an excellent opportunity to participate in several

[28] All presentations from the conference can be found here: http://go-refurb.eu/presentations/ .
Link to the event on REFURB's webpage: http://go-refurb.eu/event/refurb-conference-2017/

national events and side events addressing the subject energy refurbishment towards Nearly Zero Energy in Buildings (NZEB).

Brussels was chosen to host the final conference due to be sure to attract a target at 50 high level policy makers due to the fact that the conference took place in the same period as the European week of Regions and city and the possibility to coordinate with Renovate Europe. The consortium invited stakeholders and high-level policy makers in the six different countries to attend the conference. 66 external people and 17 internal from the consortium signed up for the conference and all of them have received information and knowledge about the REFURB project. All participants took part of the activities and votes on the day, which helped the conference to be a great platform towards knowledge-sharing, discussion and networking within energy efficiency.

This conference gave the attendances the latest findings on how to activate private homeowners by a powerful offer towards investing in energy refurbishment of their houses, and how to speed up deep energy renovation dynamics and generate impact with regional innovation and renovation offers.

Furthermore, the consortium behind REFURB presented the projects' main findings, renovation offers, specific business models and to what extent deep energy refurbishment of existing buildings can be an important part of the European green transition. The program was combined with a mix of one – way presentations of key findings and two interactive sessions, where the audience were asked to participate.


ACTIVATING CONSUMERS TO DEEP ENERGY REFURBISHMENT IN EUROPE - REFURB PROJECT CONFERENCE

13:00: Registration and coffee/tea

13.30 - 14.00: **Coaching the homeowner, eliminating the barriers on energy renovation.** *Welcome and introduction* by Virginia Gómez Oñate, Project Manager, EnergyVille/VITO (Belgium)

Creating a market for deep energy renovation in Europe. *Renovation of residential dwellings is lagging behind the political ambition. How to stimulate this market?* by Andrian Joyce, Campaign Director, Renovate Europe and Secretary General, EuroACE.

14.00 - 15.00: Session 1:
The REFURB project: How to speed up deep energy renovation dynamics with regional innovation and renovation offers?

THE HOLISTIC REFURB APPROACH FOR DEEP ENERGY RENOVATION.
How to create a succesful customer journey with focus on both business and value creation for selected customer segments
by Peter Rathje , ProjectZero (Denmark)

BRIDGING THE BUILDING SECTOR OFFERS AND THE HOMEOWNER NEEDS.
The building sector and the homeowner are not yet on the same page. REFURB looked at the missing links to create a powerful offer
by Dominiek Vandewiele, Intercommunale Leiedal and Anne Goidts, Bostoen (Belgium)

BUSINESS MODELS AND VALUE CREATION AS TOOLS TO DESIGN A CONCRETE AND ATTRACTIVE OFFER.
Non-energy and financial benefits for both the homeowner and the supply side
by Lotte Lindgaard Andersen, CLEAN (Denmark)

Summary and discussion by Peter Rathje, ProjectZero

15.30 - 17.00: Session 2:
How to generate impact with renovation offers? Rollout strategies, quality guarantee and applied examples

QUALITY GUARANTEE IN DEEP ENERGY RENOVATION.
Are performance guarantees after renovation a burden or an opportunity? Do policy and practice meet or differ?
by Fiene Grieger, ISW (Germany)

THE RENOVATION COACH FOR THE HOMEOWNER: ELIMINATING THE BARRIERS.
Single point of contact: Supporting and unburdening the homeowner in the customer journey
by Lisa Adema, Municipality of Leeuwarden (The Netherlands)

PRACTICAL EXPERIENCES IN NEIGHBOURHOODS
Energy ambassadors show their neighbours the way to save energy in their homes
by Djoera Eerland, Buurkracht (The Netherlands)

REFURB LESSONS LEARNED AND POLICY RECOMMENDATIONS FOR ROLLOUT
How to create a powerful offer for homeowners and a succesful rollout strategy with stakeholders? Time for a plenary discussion to conclude on some policy recommendations together with the audience by Alan Laws, Municipality of Leeuwarden (The Netherlands)

15.05-15.30: **NETWORKING BREAK**
poster presentation of national REFURB offers

17.00-17.15: **CONCLUSION AND OUTLOOK**
by Virginia Gómez Oñate, EnergyVille/VITO

17:15 – 18:30: **NETWORKING COCKTAIL**

refurb

RENOVATE EUROPE

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649865

Figure 18 Program final session Renovate Day

Figure 19 Impression of the final conference

5.1.2 Additional international workshops and networking activities

5.1.2.1 World Sustainable Energy Days 2018, 28 February – 2 March 2018, Wels (Austria)[29]

More than 400 experts met in Wels, Austria at the meeting place for the global energy efficiency community, the European Energy Efficiency Conference as a part of the World Sustainable Energy Days. Energy efficiency for economic competitiveness will therefore be the core theme of the European Energy Efficiency Conference 2018. Furthermore, the conference features policies, technology innovation and market development**.** REFURB was invited to present its learnings at a three-hour dedicated workshop within the Technology Innovation Conference: Energy and Buildings taking place on Friday, 2nd March. The REFURB partners presented the main theoretical results of the project complemented with the hands-on practical experiences.

[29] http://go-refurb.eu/event/european-energy-efficiency-conference-2018/

5.1.2.2 *Sustainable Built Environment 2016: Transition Zero, 8th April 2016, Utrecht*[30]

On Friday the 8th of April REFURB partners VITO and the city of Leeuwarden were invited to present the REFURB project at the Sustainable Built Environment: Transition Zero Conference in Utrecht. Over 200 participants attended the conference. The overall theme was 'Transition Zero: From Demonstrations to large-scale NET-Zero Refurbishment', covering four topics: upscaling, governance, small urban area and circular processes. The plenary programme had a line-up of inspiring keynote speakers, such as the Dutch Minister for Housing Stef Blok, Member of the European parliament Gerben-Jan Gerbrandy, ZED-Factory Principal Bill Dunster and the famous Dutch ecological architect Thomas Rau. The conference was chaired by Frits Verhey, Board Member of the TKI Urban Energy, and Jacqueline Cramer, Strategic Advisor at the Utrecht Sustainability Institute. In addition, there were eight parallel sessions featuring 36 presentations. The focus of the REFURB project was very much welcomed amongst many other EU projects with a more technical focus.

5.1.2.3 *Participation and knowledge sharing with other European projects*

- SmartEnCity (H2020)
- MODER (H2020)
- Triple A (Interreg) and See 2 Do (Interreg)
- BE REEL! (Life+) and iBROAD (H2020)

5.2 SHOWCASING REGIONAL BEST PRACTICES

5.2.1 Field studies

5.2.1.1 *Kortrijk, Belgium*

http://go-refurb.eu/kick-off_belgium/

In mid-April 2015, the partners on the newly begun project REFURB met-up in South West Flanders. The partners visited The Venning in Kortrijk. This outdated residential area was recently restored to a fully energy neutral district, which is not only beneficial to the environment but also for the residents' energy bills. Then they visited a passive house of Bostoen in Harelbeke, an affordable concept for new construction and renovation. Finally, the partners stopped by Pluimstraat in Kortrijk. This rundown street was upgraded by the owners and residents under the impulse of renovation include supervisors and the ""now-or-never-premium"" of the city of Kortrijk.

5.2.1.2 *Kranj, Slovenia*

During the partners meeting in October 2015, BSC organized a knowledge exchange conference between the REFURB project and the main regional stakeholders involved in energy policy. The conference took the format of a consultation on the way to prepare and implement regional energy plans for the BSC Gorenjska.

5.2.1.3 *Sonderborg, Denmark*

The DK-partner meeting took place 26. - 28. April 2016. Apart from internal project meetings, the Sonderborg meeting also included a ZEROtour to review different nZEB building constructions and a panel discussion with

[30] http://www.hu-conferenties.nl/index.php/sbe16/

local and national consultants and stakeholders – to discuss and test the nZEB approaches being created during the Sonderborg partner meeting.

5.2.1.4 Halle, Germany

Study trip took place on 26th of September 2016 to a listed building in Mittelstraße, Halle. A deep renovation (with a CHP unit and thermally insulating plaster and insulated attic) was executed in a half - timbered building. This building is an example of energetic refurbishment by Bauverein. The Bauverein Halle & Leuna is a housing cooperative which was founded in 1910 in Halle (Saale). The cooperative owns deep experiences in refurbishment of different types and ages of residential buildings. On the 27th of September the study-trip was organized to Lutherviertel: an energetic quarter concept with reduction of energy consumption and CO2 emissions.

Figure 20 Lutherviertel, Halle

5.2.1.5 Tartu, Estonia

Partner meeting in Tartu took place 21 to 23 March 2017. A study tour took us to Anne neighbourhood which was built in 1970s. Today the houses are in dire need of refurbishment and external insulation.

One of the first to be renovated in Tartu was a residential building 47, Anne street. The building was renovated in 2012. The whole envelope was insulated and reciprocating heat recovery ventilation was installed. Since the renovation heating costs of the house have diminished by 60-70%. The other houses on study tour were 3 and 7 Tiigi street. Those houses are in a process of being renovatedto nZEB standard. At the time of the tour the actual renovation had not yet started. The houses are of so called khurschevka type stemming their name from former leader of USSR from the time they were built. The material used is sand-lime brick and the houses´ specific energy consumption is 250 to 300 kWh/m²y. The projected energy consumption should be less than 90 kWh/m²y. The houses will be furbished with central on demand heat recovery ventilation steered by concentration of CO_2 in apartments.

Figure 21 Renovated building 47 Ann street, Tartu

Figure 22 Building in need of refurbishment 3-7 Tiigi street, Tartu

5.2.1.6 Leeuwarden, Netherlands

The last partner meeting took place in Leeuwarden/ Fryslân in the beginning of March 2018 (6-7 March 2018). The field studies included:

1. A visit to the factory of the regional building company Bouwgroep Dijkstra Draisma (BGDD) in the city of Dokkum. Here the insulated prefab façade modules are created in a semi- industrial approach;
2. A visit to the renovated social housing in two neighborhoods in Leeuwarden; In 2017, 55 social rental dwellings were renovated to all electric/ NZEB in one neighborhood in Leeuwarden. In 2018, another 50 social rental dwellings will be renovated in another neighbourhood. The dwellings received the insulated façade, heat pump, solar panels and ventilation.
3. A visit to a regional vocational school Friese Poort in Leeuwarden; here a visit was brought to the Duurzaam Doen huis (in English; Sustainable Do House), a hands-on class room;
4. A visit to a model dwelling of another regional building company, Van Wijnen Noord.

With the field studies, partners received a full insight in the NZEB market in Fryslân. NZEB (in Dutch known as 'Nul op de Meter, i.e. the absence of a traditional energy bill) is a bustling business, especially due to the

(Duurzaam Doen Huis/ Sustainable Do House vocational school Friese Poort Leeuwarden)

large- scale energy renovations taking place within the Frisian social rental sector. Phasing out of natural gas within the built environment is also an important stimulant in the Netherlands, also among private residents. This is due to the fact that natural gas extraction causes earthquakes in the neighboring province of Groningen.

Figure 23: Frisian social rental renovated houses

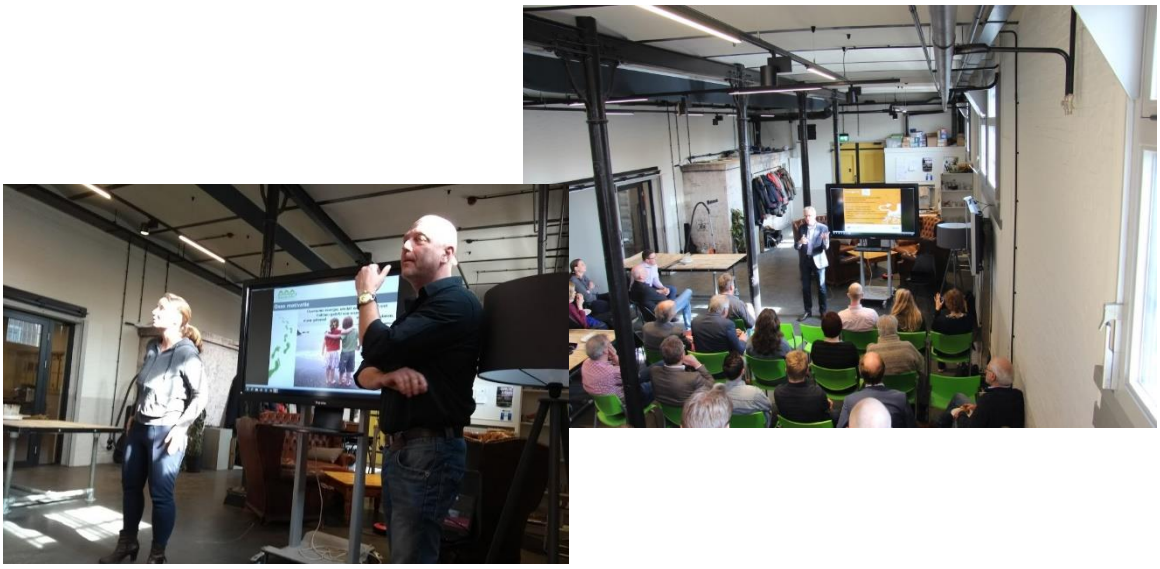
5.2.2 Local workshops and networking activities

5.2.2.1 Belgium

http://www.energiesparen.be/renovatiepact

- A number of the Belgian REFURB partners play a key role in some of the activities of the Renovation pact. REFURB partners Bostoen and Leiedal are member in 5 of the 10 workgroups of the renovation pact, based on our own specializations. In these workgroups they work together with the government and other stakeholders on the following themes: the concrete long-term goal, the renovation recommendations, the financial support, business cases and demonstration projects, and communication. In these workgroups the partners can immediately share knowledge achieved in the REFURB project with the government and the building sector.

5.2.2.2 Netherlands



Figuur 1 Presentation by 2 homeowners on behalf of foundation Aldlan Duurzaam at lunchmeeting Aldlan

- On the 15th of March 2018, Leeuwarden organized a lunch meeting to share the exciting developments taking place within the neighbourhood of Aldlân. Around 30 interested people joined the meeting. Two homeowners from Aldlân (united in the foundation Duurzaam Aldlân) shared their intrinsic motivation for initiating deep energy renovation on neighbourhood scale.
- During 2015-2017 Buurkracht organised 18 regional stakeholder [31]meetings sharing knowledge on customer journey's and segmentation.
- On September 12th 2017 a delegation of Belgian municipalities and grid operator visited Buurkracht in order to learn more about the customer journey and demand aggregation scheme. Picture below

Figuur 2 A delegation of Belgian municipalities and gridoperator visit Buurkracht

[31] For example see: https://www.buurkracht.nl/nieuws/limburgse-regiotafel-als-kennis-en-inspiratiehub

5.2.2.3 Denmark

- For testing the compelling offer, CLEAN and ProjectZero organized during 2017 several meetings/interviews with both the supply side (contractors, banks, real estate agents, energy advisers, craftsmen, building suppliers) and a group of homeowners (young families and empty nesters) in order to test the compelling offer.
- For testing the roll-out plan for the compelling offer and influence the politic frame conditions for nZEB, CLEAN organized in autumn 2017 joint Clean/ProjectZero meetings with national stakeholder, governmental bodies and NGO´s.
- CLEAN, AAU and ProjectZero had important national presentations of the REFURB concept: at the Building Green in November 2017 and Energy on the Agenda/Roundtable in November 2017.


Figure 24 Local focus group meetings with the supply side discussing the customer journey and the compelling offer

5.2.2.4 Germany

- Stakeholder meetings WP6 (owners of multiapartment buildings, consumer advice centre, architects, associations)

5.2.2.5 Slovenia

- Workshop on informing the house and flat owners on energy renovations (transfer of technical knowledge) and possibilities for grants on this field in 4 Municipalities

5.2.2.6 Estonia

- Stakeholders (technical designers and technical consultants) meeting for energy efficiency renovation with target of nZEB of multiapartments building
- One workshops for technical designers of nZEB buildings on heating and ventilation
- Participating on Sustainable Energy Week
- One workshop for technical designers on “Smart Home” solutions
- Presentation in Seminar for Housing Associations of City of Tartu on Energy efficiency renovation
- Smart Energy community, Consumer consultations for energy savings in Rõuge municipality

5.3 COMMUNICATION ACTIVITIES

5.3.1 Official media channels

Website: www.go-refurb.eu

Newsletters: The annual newsletter kept you updated on REFURB and its progress in May 2017 and April 2016. The newsletter has been send to a database of contacts provided by each partner. It is also available to download from the website.

5.3.2 Local media channels and communication highlights

REFURB brochure in all partner languages

5.3.2.1 Belgium

Warmer Wonen[32] entails a website gathering information and tools to stimulate homeowners to renovate, including contact details for the Renovatiecoach and contractors, examples of energy-efficient refurbishment, the tool Mijn Energiekompas and other useful information.

[32] https://www.warmerwonen.be/

Figure 25 March 16 2017, Leiedal hosted the launch of mijnenergiekompas.be by Flemisch Minister of Energy, Bart Tommelein

5.3.2.2 Netherlands

- Slim Wonen Leeuwarden entails a website, a Facebook and a Twitter page. In addition, homeowners/ tenants can email or call the municipality directly. Currently, the website of Slim Wonen is under construction for an update, anticipating future policy developments. Visitors are linked directly to a part of the website of the municipality. Inhabitants with lower incomes receive a card for a free consult by energy coach Klaas (see picture above, right hand corner). Leeuwarden also publishes on energy saving and energy renovation in the local newspaper in a section called 'Aan de Grote Klok'. Slim Wonen leaflets are also available in City Hall.

Figure 27 Facebookpage Slim wonen

Figure 26 Slim wonen leaflets available in the City hall

- Buurkracht

Buurkracht entails a website, a facebookpage, a linkedinpage and twitteraccount[33]. Monthly newsletters and weekly updates (on energy consumption) to participants is send.

- The Province of Fryslân

The province of Fryslân uses (among others) the Youtube channel 'Duurzame Huizenroute[34] (Sustainable housing route).

5.3.2.3 Denmark

- CLEAN

On the website of CLEAN you can find more information on the project, latest news, articles and more. CLEANs contribution builds upon our vast experience with energy renovation projects, e.g. project Green Business Growth and Controlling Energy. On this website Green Business Growth you can also find more information on energy efficiency[35].

Figure 28 Newslettre on wesbite CLEAN

[33] A website: www.buurkracht.nl; Facebook: https://www.facebook.com/buurkracht ;Twitter: https://twitter.com/buurkracht ;LinkedIn : https://www.linkedin.com/company/buurkracht ;

[34]For an example see: https://duurzamehuizenroute.nl/ervaringsverhaal/familie-devries-berltsum

[35] Website Green business Growth: www. grønerhvervsvækst.dk; Website Clean: https://www.cleancluster.dk/project/refurb/; Facebook: https://www.facebook.com/GroenErhvervsvaekst/posts/1631798806840756

Figure 29 Facebookpage and website Green business Growth

5.3.2.4 Germany

The German partners have regularly presented the Refurb results in the LENA Energieforum with over 100 participants with technical experts, public administrations, consumer advice centres, private homeowners, associations and banks amongst the audience. There has also been close knowledge exchange with other housing cooperatives from all over Germany and architects.

The newsletter 'Netzwerkbrief Stadtentwicklung' of May 2018 of the network of housing cooperatives and municipal housing companies in Halle (Saale) included an article on REFURB. This newsletter circulates 500 printed copies, Link: http://www.netzwerk-stadtentwicklung-halle.de/netzwerkbrief/Netzwerk-Brief_1_2018_final.pdf

5.3.2.5 Slovenia

- BSC Kranj had an entire appendix to the newspaper, where they presented our fields of work and our projects, Refurb was described and presented.
- Refurb results are presented in report about work on tasks of regional development activities, which are of public interest, prepaired by RDA BSC Kranj.

5.3.2.6 Estonia

On the website of TREA you can find more information on Refurb and Energy efficiency. TREA has also regularly shared knowledge with representatives of housing associations and stakeholders in the renovation process as designers, architects, HVAC engineers and contractors. Refurb was presented during the EstBuild fair and the Europe House. Homeowners were also directly addressed with information leaflets.

6 Key Lessons Learned and Recommendations

The REFURB project aimed at bridging the gap between the supply side (building construction sector) and demand side (homeowners) by developing dedicated renovation packages for different market segments within the residential sector.

REFURB implemented a pragmatic ”bottom up” approach (e.g. conducting various analysis, desk research and collecting information, testing through focus groups and local pilots), to achieve its aim resulting with the following main activities:

- Understanding the dynamics (i.e. various segments) of the home renovation market;
- Understanding the demand and supply side barriers and drivers;
- Analysis of the existing demand side aggregation schemes;
- Placing the homeowner at the centre, through understanding the decision and renovation making process and the renovation process.
- Finding out what is driving homeowners to renovate their homes to nZEB, but from the perspective of the supply side.
- Investigating one-stop-shops as way to unburden a homeowner and ensure trustworthy advice with optimal technical solution (’renovation package’) for deep renovation towards nZEB standards, and the role of Single Point of Contact.
- Establishing the deman-supply side combinations for the selected segments of the residential sectors, and their local tailoring (differences) for the six REFURB participating EU regions.
- Analysing quality assurance scheme for home renovation towards nZEB standards in the REFURB countries, and analysing the supportive financial constructions for homeowners to do nZEB renovations.
- Finally, developing a method, an online-tool and a set of REFURB countries specific ”compelling offers”, and
- Ways to have their wide-spread rollout and transferability plans.

Drawing from this rich list of REFURB main activities, the key **lessons learnt with recommendations** are here presented.

Custommer segments of the nZEB home renovation market

The tailored segmentation analysis of the nZEB renovation market resulted in defining six clusters with similar characteristics. It was very important that this analysis is based on a multidisciplinary view, including a behaviour study, psychology, sociology, economics, technology, legislation, architecture, building physics, urbanism. Therefore, understanding the dynamics of the home nZEB renovation market required cooperation of different disciplines going beyond the traditional construction, energy and technical expertise.

Defining customer segments has its complexities, namely through different dwelling characteristics and different dwellers characteristics. To pass this complexity, a ‘matrix’ had to be created as means to identify the (six) market segments with high-potential for which it makes sense to further develop “compelling offers” for homeowners on nZEB renovation.

Drivers and barriers for nZEB renovation

As part of its "bottom up" approach, a thorough analysis was made through mapping the drivers and barriers homeowners encounter to renovate (or not) their home. The thematic clustering confirmed once again the complex interplay of technical, financial, social and behavioural, context of the drivers and barriers.

An interesting lesson learnt was that although similar drivers and barriers were found in the six identified high potential customer segments, local (regional) conditions differ and may play an important role into the weight of each driver or barrier. The local conditions include local legislation, ownership market, subsidy schemes, conditions of the building sectors and its readiness to deliver nZEB renovation, etc.

Demand side (homeowners) aggregation schemes

REFURB analysed 10 existing demand side aggregation schemes already established in the participating countries Denmark, Netherlands, Belgium, Estonia, Slovenia and Germany. Focus was given to analyse their strengths (success factor), weaknesses (fail factor) and how to reduce the drop-out of homeowner during the renovation process. A range of lessons were learned. **For example**,

- The strength in organising homeowners is in: focusing on a well-defined customer segment; providing independent tailor-made advice; reduce the burden of a renovation process; give trustworthy information on the benefits of renovation (energy, monetary, other); involvement of a neutral party (i.e. local authority/government); access to financial incentives and clear information on the upfront costs.
- The fail factors in organising homeowners are: weak financial structure of the aggregation scheme; predominantly aimed at raising awareness; insufficient support for the added value of reaching the nZEB renovation standard; inadequate involvement of the key stakeholders in the value chain; the approach to inform and motivate home owners is too generic, lacking in specific tailor-made information; and high dependence of the aggregation scheme from the external financing and subsidies provision.
- Key strategies to reduce likelihood of homeowners to drop out of their participation in an nZEB home renovation aggregation scheme are: provide personal approach and tailored advice; understand the value of creating kind of 'communities', for example by groups of neighbours; give the long-term perspective on the renovation; quality knowledge on the renovation measures and time planning of the renovation; support the aggregation scheme with a funding plan, from undertaking small-number of nZEB renovations up to scaling up, i.e. a solid business models.

Drivers for homeowners to renovate to nZEB standards from the perspective of the supply side

An interesting finding of REFURB was that the supply side perception on what drives the demand side to renovate is very approximate to the real drivers of the demand side.

By actively working with the supply side stakeholders in REFURB and listening their views on the solutions for nZEB home renovations that are (near-)available on the market, several lessons were learnt. Namely, a clear understanding of the country context is required to estimate the replication potential of nZEB home renovation packages on a national and EU level. Therefore, local conditions that influence the supply side were explored of the participating countries in REFURB. It was learnt that:

- In general, two categories of solutions can be distinguished, technical (linked to the building typologies in each country) and non-technical solutions (financing models, online tools, demonstration/showcase projects, means for quality assurance, etc) to renovate houses to nZEB standards;
- The non-technical solutions are more important than the technical solutions to seduce homeowners to renovate to nZEB standards;

- The One-stop-shop-solutions seem to have the highest potential to convince the homeowner to renovate to nZEB since they offer a holistic approach;
- The specific country context determined the success of the one-stop-shop solutions, most of them as embedded in a much broader programme.

Towards creating "compelling offers"

The REFURB project focused on bringing forward solutions to solve the complex interplay and gap between the demand and supply side in the residential sector nZEB renovations. The main aim was to develop an integrated approach which bridges the gap between the demand and supply side, through providing 'compelling offer', i.e. an "offer you can't refuse" – to a house owner.

All country partners in the REFURB project carried out a tailored analysis of their individual markets and created a solid overview identifying key local segments, drivers and solutions. Two main groups of segments were identified. For each segment the relevant local drivers and solutions were identified and the similarities between countries identified.

- Single Family Houses (SFH) with Young Families (YF) and Empty Nesters (EN) as dwellers.
- Multi Family Houses (MFH) with Owners and Tenants as decision maker and dwellers.

It was learnt that the drivers identified for the segments are mostly rational relating directly to a given "pain" or "gain" for the building owner. It is important that these rational drivers are addressed when creating a compelling renovation package design. In the design of the compelling offer it is also important to address the non-rational drivers in the decision process, so an offer to be easy, accessible and affordable to attract a majority of the market in each country.

An important aspect of a "compelling offer" is also the financial stimuli to reward/stimulate homeowners when renovating to nZEB standard. REFURB found that although existing coaching, grants and subsidies for individual energy-efficiency related house renovations, as well as tax deduction or tax reduction stimuli are already available on the market in each REFURB country, number of challenges exist in both single family and multi-family segment.

Considering these challenges, REFURB made specific recommendations in regard to fiscal regulations and subsidies; loans and mortgages; construction of "compelling offer" renovation packages with focus on health, comfort aesthetic; more effect of the EPC and regulation of validation of houses; develop and support local energy advice programs.

Defining "compelling offers"

REFURB developed a methodology, a toolbox and a template for creating compelling offers. The tools used for developing the compelling offers were: customer journey, value proposition, and the business model generation. Based on using these tools, REFURB created a database of 10 country specific and market/ownership segment related (single or multi-family houses, focused on private homeowner), compelling offers for BE, DK, DE, NL, SI and EE. It was learnt that certain similarities between the countries in creating REFURB compelling offers, especially for the single-family houses exist.

The compelling offer can be summarized in the following steps:

1. Decide your market segment
2. Use the customer journey to identify the stumbling blocks and advantages/actions

3. Generate the value proposition
4. Describe the business model
5. Add the financial support (optional)
6. Appoint a Single Point of Contact (if required).

REFURB learnt that:

- Key to have a successful completed journey of a house owner when undertakes renovation is in understanding the customer journey (each of its 11 steps) and tailoring it to meet the specific homeowner's requirements.
- A strong value proposition addresses the pains (barriers), gains (drives) and jobs (solutions) relevant for the chosen house renovation market segment.
- The value proposition in the business model should be based on the value proposition for the key stakeholders in the nZEB hose renovation process.

Delivery of the 'compelling offers' is typically done by online tools. There are already many tools supporting energy renovation of houses. A lesson learnt is that the great number of descriptive tools in each country might overwhelm homeowners and cause difficulty in finding the right one. Therefore, a government-managed overview of the tools is advisable.

With respect to calculation type of online tools, the situation seems to be different in each country. While there is still variety of tools, the level of information required to perform a meaningful calculation varies greatly. It was concluded that that the initial stages of the customer journey are well covered by online tools and provide fast numbers and "ballpark estimates; although, such calculations are not enough to offer a tailored solution for deep energy renovation.

It was recommended that further steps of the customer journey are supported by Renovation Coach service that would guide house owner through technical and financial aspects of the journey.

Based on the knowledge from the market analysis of the online tools and their strengths and weaknesses, the REFURB partners were able to develop a specific online tool and approach to ensure market uptake of nZEB house "compelling offers" containing renovation packages.

Recommendations for this tool for the demand side of the renovation process (house owners) should be:

- User friendly.
- Have appealing, intuitive and transparent interface.
- Should be easy to follow (it should be easy to fill in information).
- Should not be too detailed and not require too much time spent.
- Should give clear und understandable to house owner indication of what is the current state of the building and where is the priority for the renovation.

My Energy Compass (Leideral Region Tool) was designed to convince homeowners to start with their customer journey to renovate their house and to nudge them through all other steps in the customer journey. This tool can be rolled out into other regions in Europe using the methodology developed while creating 'My Energy Compass', taking into account local conditions.

Quality Assurance

An important lesson is that quality assurance for home renovations is handled differently per country depending on the market situation. Also, that performance guarantees are neither a trigger for homeowners to complete their nZEB renovation nor a major barrier in entering the customer journey.

However, this does not mean that quality issues should be neglected or that actions should not be put in place to achieve the expected energy savings. It is rather an appeal for a holistic quality approach: the entire customer journey should have quality checks and balances built in.

While certification of the supply side is imposed in the majority of the quality assurance schemes, performance guarantees are neither legally implemented nor found in practice in general.

Some loans or financial incentives for energy renovation are linked to the quality of the works or the energy performance of the building afterwards. Nevertheless, there is no guarantee to actually achieve energy savings to the expected extent, because they are usually based on the EPC calculations instead of on the real savings.

Quality assurance can take the form of a toolbox of quality assurance measures embedded in the 'compelling offers'. Which kind of measures and under which conditions must be tailored to the local guarantees for energy savings is one way to create customer confidence, but there are a lot of other options possible that can achieve the desired result.

There still is a need for stronger collaboration and trust building between 'traditional' partners such as contractors, designers and consultants. In addition, collaboration is recommended with new types of stakeholders such as renovation advisors, project managers, ESCO's, renovation stores, one-stop-shops, and non-profit organisations. Therefore, the single-point-of-contact (SPoC)revealed highly relevant for market uptake as a way to improve the customer relationship by providing guidance along the entire customer journey.

In one-stop-shops, the SPoC builds a trust relationship with the customer during the complete customer journey. The main challenge is to create customer confidence to get homeowners on board throughout the entire (11 steps) of a customer journey towards nZEB home renovation.

Wide spread roll-out

In order to facilitate widespread application of a "compelling offers" each participating country carried out a pilot test in collaboration with regional partners to create, test and improve the compelling offers for deep energy renovation for their target segment(s).

The regions selected focus groups of local stakeholders (including homeowners) to participate in the pilot tests. The compelling offers were adapted based on feedback received.

Lessons learnt from the focus groups was on their value in terms of discussions and networking opportunities during the focus group meetings itself. They created a basis for social acceptance among the involved stakeholders, strengthening the local network and increasing the chance of market-uptake on a local scale.

Homeowners were able to interact with installers, local decision-makers and vice versa. Additionally, important lessons were learnt from focus groups about how to reinforce a "compelling offer".
Based on experiences within the network and focus groups, it was recommended that:

- It is very important for a government to invest in a solid and consequent approach for the first four crucial steps of the customer journey, starting by spreading the message on the importance and benefits of energy saving.
- A stimulating and facilitating municipal government can help to create 'synergy' within the boundaries of the municipality (the demand side) as well as the market for deep energy renovations (the supply side). Keeping an open dialogue with homeowners and stakeholders is key.
- It is good to have compelling offers that clearly differ from each other. Opting to stimulate and promote multiple and diverse types of compelling offers and approaches, enhances the level of success as it will increase the change that (certain aspects of) either one of them will appeal to a wide range of residents.

In terms of further transferability, a plan was composed that describes how uptake of "compelling offers" can be implemented in other regions and cities. The plan focussed on private homeowners throughout Europe and consist of three different phases:

- Phase 1. Implementation of legislation (where needed) and creating general awareness and support in government and industry.
- Phase 2. Ensuring the building industry is ready.
- Phase 3. Making of a "compelling offer" in combination with local pilots for validation and demonstration in practice of the compelling offers.

The three phases are translated to a bottom-up "local to national" cycle, with 3-steps:

1. The municipality in cooperation with local actors in private- public partnership is implementing necessary actions to initiate and secure a local functioning customer journey;
2. Combined with stronger engagement of national stakeholders;
3. And securing national government improving incentives and promotion of energy retrofit at national level based on the REFURB approach. Stronger national support will potentially attract more municipalities and help scale up the REFURB concept to other regions and municipalities.

7 The REFURB Glossary

One Stop Shop (OSS) or one stop shop concept for home renovations

One can clearly distinguish 'one stop' and 'shop': these are the two main characteristics of OSSs:

- A 'shop', meaning a business or public entity offering home renovation services.
- A 'one stop', meaning it is one place to go to for the customer if they want a home renovation service (and they do not have to go shopping elsewhere).

OSSs typically include a SPoC – A single point of contact to homeowners

Examples of one stop shops: Warmer Wonen (BE), ZEROhome (DK), SLIM wonen (NL). B

Compelling offer

- This corresponds with 'home renovation service', 'one stop shop offer' or 'one stop shop solution'

Example: In REFURB, The Netherlands distinguished three different compelling offers ("village ESCO', 'modular NOM', 'a la carte NOM')

Renovation package

- Definition:

> *"An easy-to-understand commercial offer to an end-user, written in non-technical language which satisfies his/her requirement for comfortable living but at a higher energy-efficiency of his/her dwelling. The offer comprises the optimum combination of technologies to be installed in the most logical sequence, tailored to the type of dwelling, the state of the building, the geography in which the dwelling is located and socio-economic parameters. Offers are understood to entail the unburdening of the end-user, so he/she is assured of an agreed higher energy efficiency without worrying about individual technology choices."*

Example: In REFURB, Denmark developed a number of renovation packages for their compelling offer

Demand aggregation

- Definition:

> *"A method for cooperation of homeowners, or national / regional / local program to organize the demand side so the group of homeowners are assisted in their housing renovation process to overcome barriers, and to improve the position of the demand side, e.g. towards the supply side. Demand aggregation schemes target more renovations, and/or improve the renovation e.g. in term of energy efficiency."*

Examples are Buurkracht. Other examples are analysed in D2.3 http://go-refurb.eu/wp-content/uploads/2016/11/REFURB_D2.3_Organizing-demand.pdf