



# Deliverable 4.1

## Demand - Supply Combinations

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# Summary

The REFURB project focuses on bringing forward solutions to solve the complex interplay and gap between demand and supply in renovation of the residential sector working towards Nearly Zero Energy Buildings (NZEB). Previously, in the REFURB project a mapping of the Supply and Demand side, relevant for NZEB-renovation has been carried out. In this report a solid overview of the main findings of this work is used as input for a **cross-link of the Demand drivers and Supply solutions**. It is the first step towards bridging the gap between Supply and Demand and develop renovation packages of “offers you can’t refuse”.

The general method applied for the development is illustrated in .

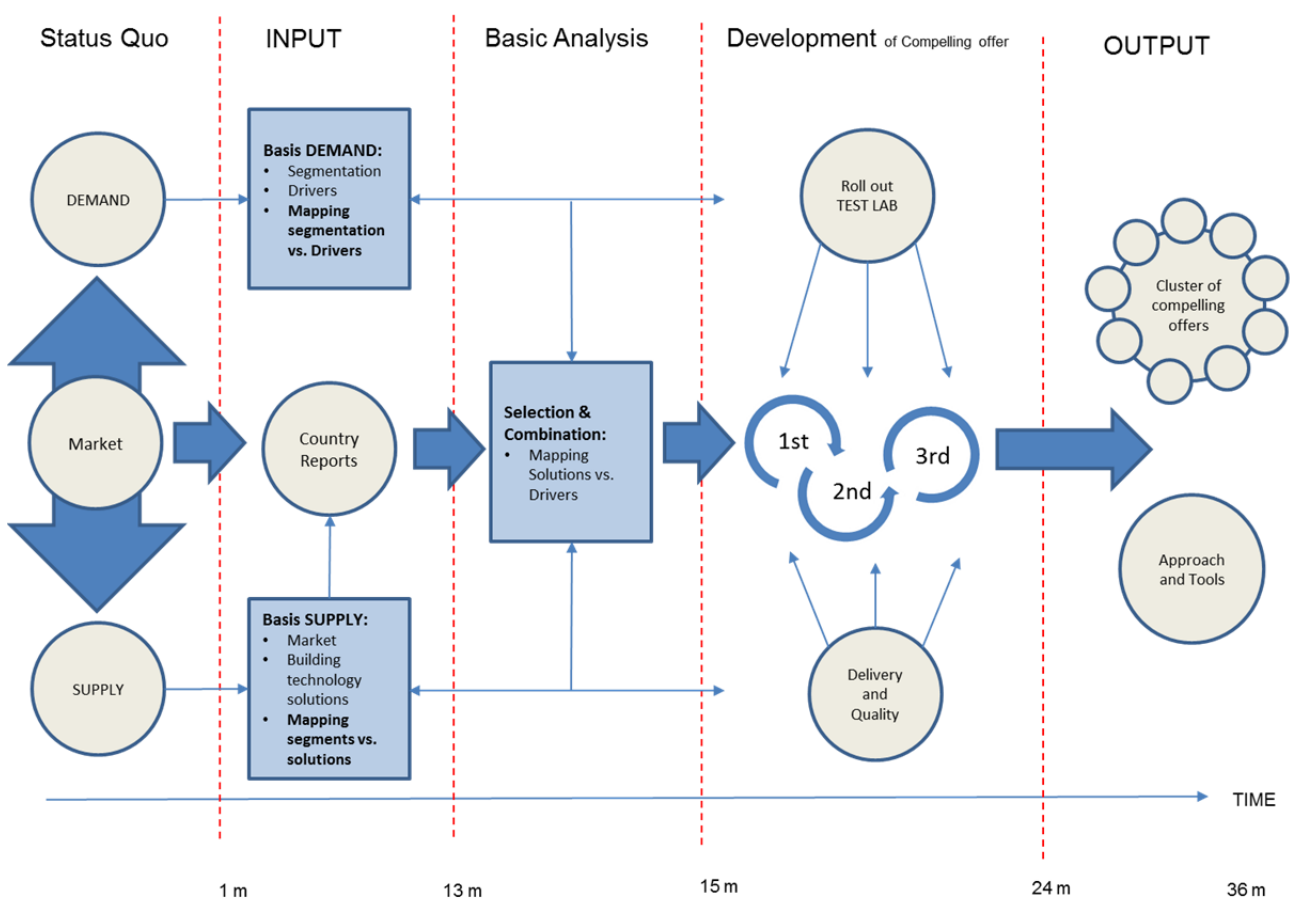


Figure 1 Method for designing “An offer you can’t refuse”, incl. a timeline for the development in month (m).

The interplay between Segments, Drivers and Solutions is key and is roughly illustrated in Figure 2 as the three are all connected and must be considered when designing offers to the home owner. The complexity is untangled by simplifying, clustering characteristics into main categories and by **looking at one segment at a time**, consisting of an identified specific Dweller and Dwelling. By doing so it is possible to make a cross-link of the main Drivers and most relevant Solutions for a specific segment.

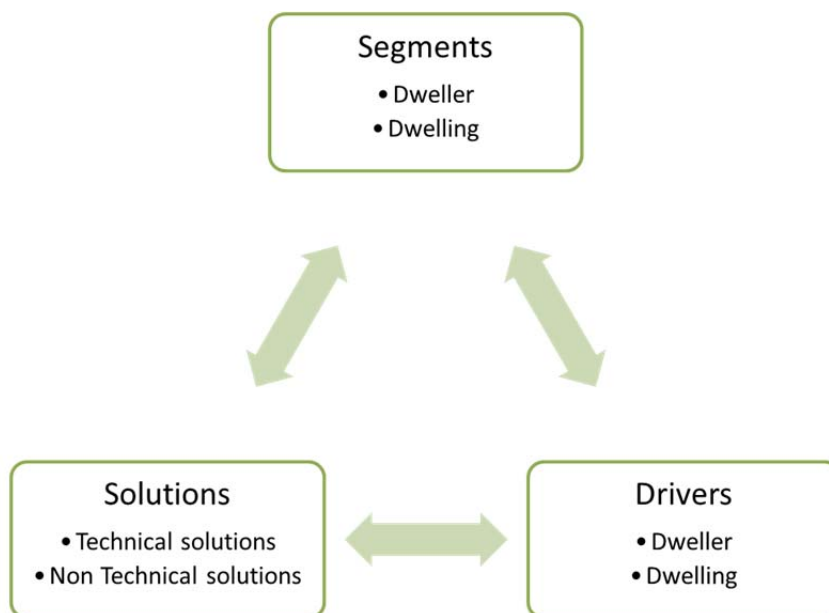


Figure 2 The relationship between Segments, Drives and Solutions

5 generic high potential segments have previously been identified in the REFURB project i.e. in this report, 5 drivers vs. solutions matrixes has been created and the main connection points is visualized. The main conclusion of this analysis is summaries in the tables below:

### Young families

Table 1 Top 3 drivers and matching solutions for 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 standard
Largely driven by Social and Behavioural elements, energy saving matters	Need easy tailor made approach and renovation coaching which speaks to values & attitudes.

### Post-war suburbs with detached houses

*Table 2 Top 3 drivers and matching solutions for 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.

### Empty nesters

*Table 3 Top 3 drivers and matching solutions for 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

### Terraced houses with a high energy bill

*Table 4 Top 3 drivers and matching solutions 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



## Convinced energy savers

*Table 5 Top 3 drivers and matching solutions for 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

It is important to emphasize that the identifications of the primary connections at this point only is a **generic justified evaluation** of which solution best matches the identified drivers, based on the research carried out so far in REFURB.

The conclusions will serve as the platform and inspiration for the local tailoring and production of minimum variable products, i.e. prototypes of Renovation Packages creating the first compelling offers.

As emphasised in the method description, it foreseen that many iterations for this work is necessary and the method recommended for this phase is the Lean Startup method by Eric Ries<sup>1</sup>.

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<sup>1</sup> Ries, E. (2011). *The Lean Start Up method*. Crown Business. Available at: <http://theleanstartup.com/>

## 2 Introduction

### 2.1 BACKGROUND

Renovation, and especially deep renovations of the residential sector working towards Nearly Zero Energy Buildings (NZEB), is lagging behind the European political ambitions for energy renovation.

There exists a wide variety of supply solutions and services, which can reduce the energy use in the residential sector, however the demand for these solutions is not very outspoken. The main barriers relate to fragmentation of the renovation offer, resulting in inefficient or partial solutions. One way to solve this is the use of a 'one-stop-shop concept'. Many have been put into practice, some successfully, others not. They often lack an understanding of the concerns and demands of homeowners. The fact remains that there exists a wide gap between supply and demand in this area. The gap consists of a complex interplay between many parameters ranging from social and behavioural elements to financial, political and building structure elements. The complexity in this area and lack of solid understanding and truly compelling offers is preventing the roll out of energy renovation in the residential sector at the scale needed to reach energy reduction targets.

The REFURB project focuses on bringing forward solutions to solve this complex interplay and bridge the gap between supply and demand.

### 2.2 CONSTITUTING THE COMPELLING OFFER - WORK PACKAGE 4

Work package 4 (WP4) of the REFURB project ("Constituting the Compelling Offer") systematically addresses the gap between the supply and demand. By applying insight and knowledge gathered and developed in especially work packages 2 ("Demand") and 3 ("Supply"), key findings and results are combined and a new overview of the interplay between different parameters is developed.

The core objective of work package 4 is to **combine findings and information derived in the other REFURB work packages**. Through iterative steps the complexity of the area will be untangled and work package 4 will provide an overview of general and specific clusters of solutions for "an offer you can't refuse" for the private homeowner. Work package 4 consists of the following deliverables, where this report is D4.1:

- D4.1 Report: Demand - supply combinations
- D4.2 Report: Local tailoring and overview of regional differences
- D4.3 Report: Supportive financial constructions
- D4.4 Report: Renovation packages
- D4.5 Report: Online customer tool and market approach

An overview of the interaction between work packages relative to work package 4, can be found in Figure 4 in section 2.5 of this report.

## 2.3 SCOPE OF THIS REPORT

The scope of this report is to create a solid overview of the main findings from the Supply and Demand mapping carried out in previous REFURB reports (WP2 Demand side Mapping and WP3 Supply side Mapping) and from this cross-link the demand drivers with solutions.

The demand side of the REFURB project refers to *private homeowners, which is a diverse group of decision makers in energy efficiency investments. They are not well organized and have a limited capacity and ambition to inform themselves on technical details of energy efficiency solutions.*

The supply side of the REFURB project refers to *professional and commercial companies and individuals which offer technological solutions, which are measures related to the improvement of the building performance and non-technological solutions which are understood to be measures relating to process such as financial or communicative aspects*

The outcome of the cross-link will be a generic matrix, which systematically illustrates the connection points between supply and demand, providing valuable insight to the further development of renovation packages. It is the first step towards bridging the gap between Supply and Demand. This report also serves as the fundamental basis for the further development.

## 2.4 CLOSING THE GAP – THE DESIGN METHOD

Closing the gap between supply and demand takes many steps and the method used is described below and grafically illustrated in Figure 3.

**First phase STATUS QUO:** Status quo is the current situation, where we have the demand side and the supply side as two separate elements in the market, resulting in a slow movement towards energy renovation at NZEB standards.

**Second phase INPUT:** Input and main findings is gathered from the supply and demand analysis.

**Third phase ANALYSIS:** The first basic combination analysis is carried out by combining main findings in a matrix mapping solutions vs. drivers for identified high potential segments. This is done on a generic segmentation level in this report (D4.1) and will serve as an example, applied to exemplary high-potential segments, and will then be carried out for specific local segments and their identified drivers at a national level in D4.2 by the national partners.

**Fourth phase DEVELOPEMENT:** Once the basic analysis is in place the true development towards the compelling offer “an offer you can’t refuse” will take place. It is foreseen that many iterations for this work are necessary and the method used for this phase will be the Lean Startup method by Eric Ries. The Lean Startup method provides a scientific approach to creating and managing new ideas and getting a desired product into customers' hands faster.<sup>2</sup> It builds on the iterative philosophy of building a minimum viable product, measuring it, evaluating, adjusting and building a new, improved product. This method is chosen as it makes use of a feedback loop structure and is a well documented method for developing and testing new ideas

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<sup>2</sup> <http://theleanstartup.com/principles>

**Fifth phase OUTPUT:** The output of workpackage 4 will be clusters of tested, compelling offers for the homeowner in the private building sector, developed for national and regional use as well as an online tool with approaches to be applied when developing new solutions.

This report (D4.1) and the following local tailoring report (D4.2) covers phase 1-3.

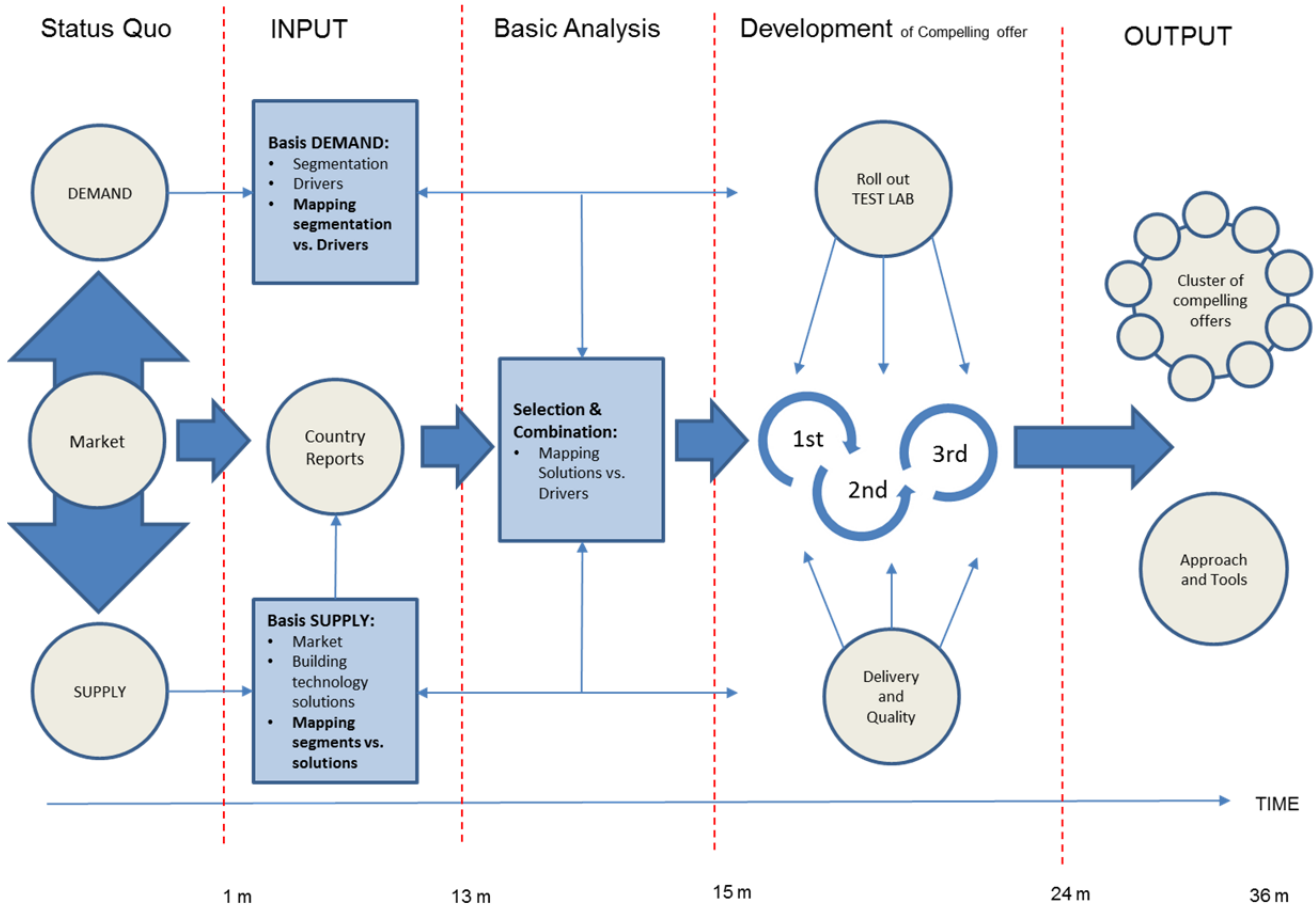


Figure 3 Method for designing “An offer you can’t refuse”, incl. a timeline for the development in month (m).

## 2.5 COMPLEXITY AND RELATIONS TO PARALLEL REFURB REPORTS

The model, illustrated in Figure 4, shows how content and analysis developed within REFRUB is used for “Constituting the Compelling Offer” (WP4) and how the different deliverables interrelate and interact with each other. The model also reflects that the development of packages, market uptake tool and supportive financial solutions (D4.3, D4.4 and D4.5) together form a lab for developing the compelling offer and that a continued and close dialogue and coordination between the different related work carried out in parallel work packages becomes more and more important throughout the project.

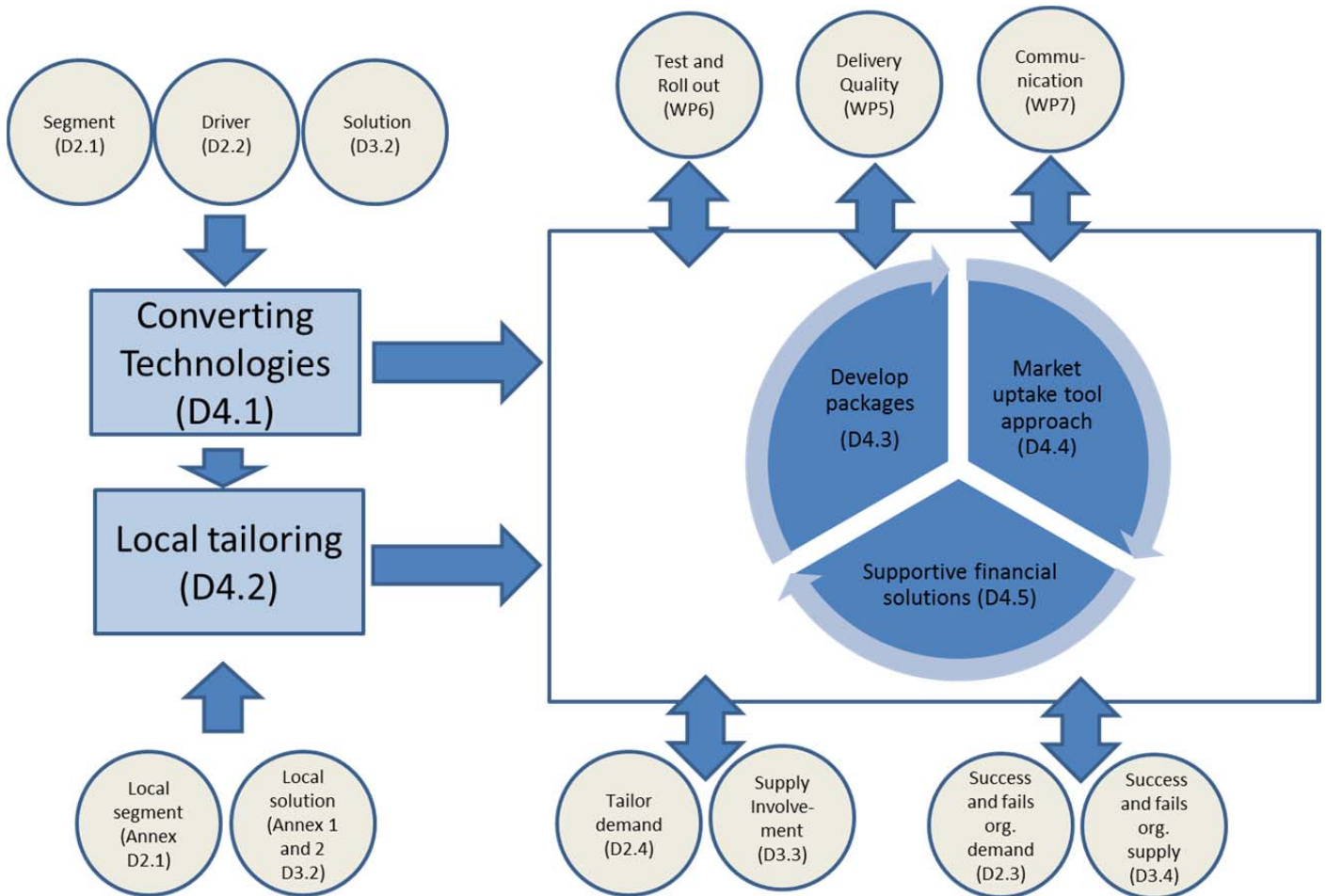


Figure 4 The interaction between the different work packages and deliverables in the REFURB project relevant to work package 4 "Constituting the Compelling Offer".

# 3 Key findings from the demand side mapping

In the work carried out in Demand Side Mapping (WP2), a segmentation of the demand side is established, and insights are gained into the wishes, needs and motives of homeowners to invest (or not) in energy efficiency measures.

Segmentation is the first step towards a better understanding of the homeowners, a diverse group of decision makers in energy efficiency investments. In the second step the drivers and barriers of these segments are investigated. Together the segments and drivers create the basis for a demand. The key findings and methods of the work in WP2 will serve as a basis for the analysis in this report and are briefly described in the sections below.

## 3.1 SEGMENTATION

The REFURB report ‘Demand side segmentation in the EU and regions’ (report D2.1) offers a framework for creating a tailor-made segmentation or defining a set of segments that fit a certain context in a country. Based on the insights from studies, best practices and experiences, the REFURB partners created a matrix as a tool to design tailor-made segments. This matrix organizes the interplay of dweller characteristics (interesting for demand aggregation schemes) and dwelling characteristics (interesting for NZEB renovation).

A multidisciplinary view to the creation of the segmentation is essential and for this a useful segmentation tool has been developed in D2.1 and is illustrated in Table 6 Matrix as a tool to segment for demand aggregation schemes for NZEB- renovation in the residential sector.

*Table 6 Matrix as a tool to segment for demand aggregation schemes for NZEB- renovation in the residential sector*

Clusters of dwelling characteristics	
Clusters of dweller characteristics	<p><b>SIMILAR dwellings</b></p> <ul style="list-style-type: none"> <li>• Neighbourhood type</li> <li>• Dwelling type</li> <li>• Construction era</li> <li>• Construction type</li> <li>• Historical value</li> </ul> <p><b>STATE of the dwelling</b></p> <ul style="list-style-type: none"> <li>• Urgency for renovation</li> <li>• Inconvenience linked with renovation</li> <li>• Inconveniences and defects</li> <li>• Value of the house</li> </ul> <p><b>energy saving POTENTIAL</b></p> <ul style="list-style-type: none"> <li>• Energy performance</li> </ul>
	<p><b>The right MOMENT</b></p> <ul style="list-style-type: none"> <li>• Stage of life</li> <li>• Time to manage renovation project</li> <li>• Expected period to own the</li> </ul>

<ul style="list-style-type: none"> <li>house</li> <li>• Age of dweller</li> <li>• Energy use patters</li> <li>• Home occupation pattern</li> </ul>			
<b>Different PERSONALITIES</b> <ul style="list-style-type: none"> <li>• Type of decision maker</li> <li>• Renovation needs</li> <li>• Access to information</li> <li>• General knowledge level</li> <li>• Technical knowledge level</li> <li>• Male/female</li> </ul>			
<b>Available and INTENTIONS</b> <p style="text-align: right;"><b>POSSIBILITIES</b></p> <ul style="list-style-type: none"> <li>• Financial possibilities</li> <li>• Owner status</li> <li>• Willingness to invest in energy efficiency</li> <li>• Intentions to renovate</li> <li>• Environmental values and attitudes</li> </ul>			

Based on the knowledge collected and gained in report D2.1 of the REFURB project a set of **5 high-potential segments** for integrated NZEB-renovation packages and demand aggregation schemes were selected and will be used as the **generic examples** in this report:

1. Young families (dweller segmentation)
2. Post-war suburbs with detached houses (dwelling segmentation)
3. Empty nesters (dweller segmentation)
4. Terraced houses with a high energy bill (dwelling segmentation)
5. Convinced energy savers (dweller segment)

## 3.2 DRIVERS AND BARRIERS

The REFURB report “Mapping the demand drivers” (D2.2) describes the drivers and barriers in a NZEB renovation process.

- **Drivers** are the counterpart of the barriers: they are the psychological, social, financial and other positive arguments for carrying out a renovation. These may also originate in motivations, desires, needs and the financial situation of homeowners.
- **Barriers** are the psychological, social, financial and other negative arguments not to carry out a renovation. These can originate in motivations, desires, needs and the financial situation of homeowners.

A thematic clustering of drivers and barriers was developed (in task 2.2) and will serve as the basis of the work in this report:

- **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, including the behaviour and attitude of the dweller, as well as the (social) conditions for making a decision.
- **Context** drivers and barriers. These are external factors, not directly linked with the dweller or dwelling characteristics, but deal with the particular situation or context the homeowner has to deal with. E.g. legal and administrative issues, tenant-landlord issues, organisation of the building sector etc.

It must be stressed that **drivers and barriers are primarily connected to the people (the dweller) living in the dwellings and making the decisions.** The nature of drivers versus barriers is not always very clear and depends on the particular situation and nature of the homeowner. A driver for one person can be a barrier for another.

Figure 5 developed in D2.2 illustrates the clustering of the drivers and barriers. The clustering will be used for the creation of the solutions vs. driver matrix overview developed in this report.



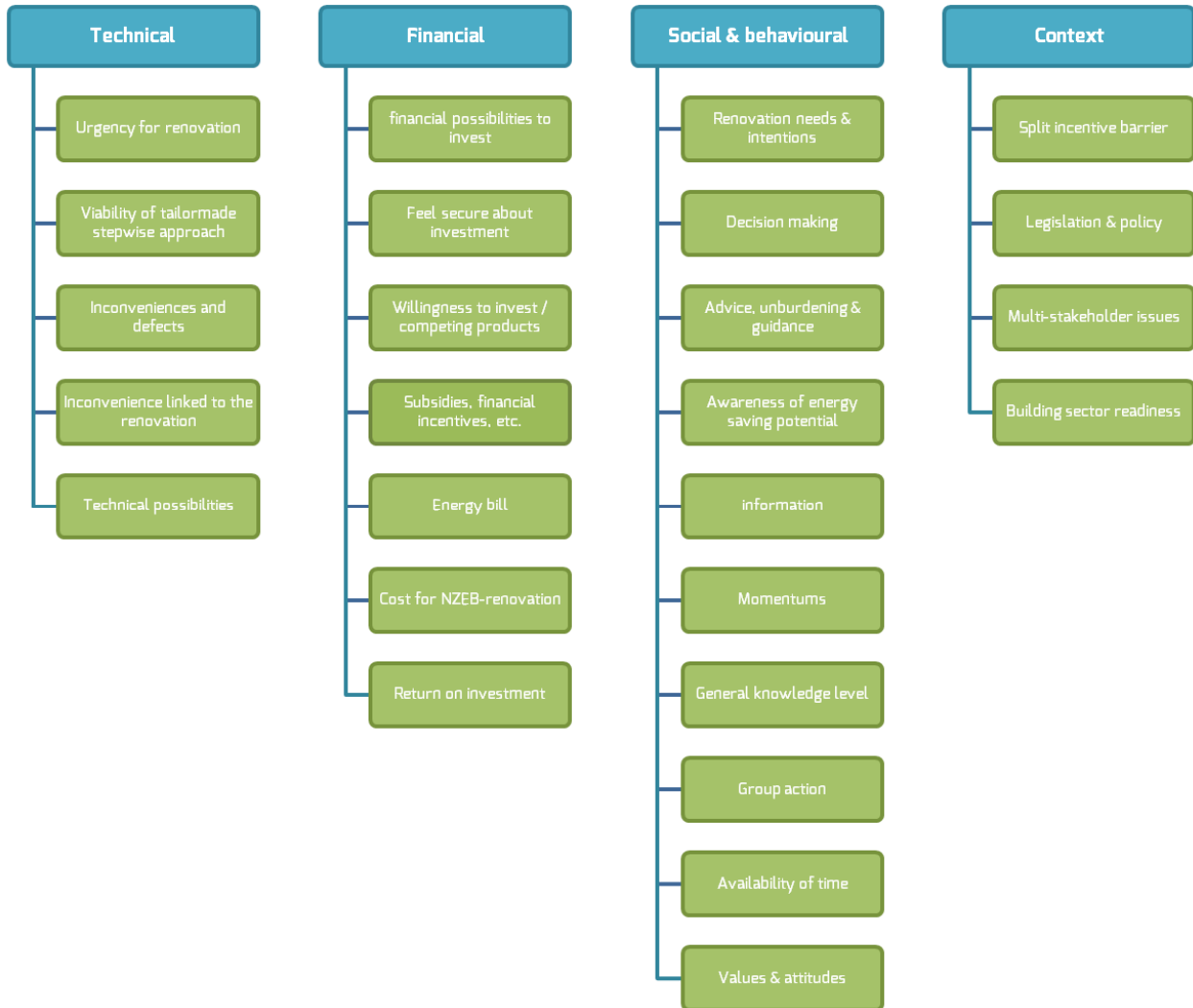


Figure 5 Clustering of drivers and barriers for NZEB renovations

### 3.3 MAPPING SEGMENTATION VS. DRIVERS

In the following the findings from the demand mapping is illustrated in generic segment matrixes which give an overview per segment with identification of the applicable drivers and solutions relevant for each of the high potential segments.

A comprehensive overview of the segments vs. drivers and solutions is illustrated in section 3.3.6.

#### 3.3.1 Segment 1: “young families”

These homeowners are typically 25-45 years old and have young children. They remodel their own house to fit future needs, with the intention to live for a long time in the house. This provides the “momentum” of a major renovation, an opportunity to integrate with deep NZEB-renovation. Unfortunately, their financial possibilities are limited and they have very limited time to manage a renovation project.

This segment was designed based on dweller characteristics. As a result, technical drivers & barriers are not dominant for young families.

**Financial barriers** are important for young families. The availability of financial possibilities to invest is a very important barrier, linked with the limited willingness to invest in energy efficiency because young families have a lot of competing needs to be financed.

**Social and behavioural drivers & barriers** are important as well. They have renovation needs: they need to increased comfort levels, or to adjust the architectural concept to house the family. The **need & intentions for comfort improvements** are an important driver for NZEB-renovation. However, they have **limited time** to manage a renovation project, and the **inconveniences linked with the renovation** (dust, noise etc.) can’t be too high.

Drivers and Barriers applicable to the segment “Young Families”

*Table 7 Drivers and Barriers for the segment Young Families*

Driver and Barriers Cluster categories	Comment – Applies to segment
<b>Technical</b>	
Urgency for renovation	
Availability of tailor-made approach	
Inconveniences & defects	
Inconvenience linked to the renovation	Applies: due to intense use of dwelling, renovation is more difficult
Technical possibilities	
<b>Financial</b>	
Financial possibilities to invest	Applies, rather limited financial possibilities
Feel secure about investment	
Willingness to invest / competing products	Applies, also a lot other needs/costs as family (family car, travelling, cost for studying children...)
Subsidies, financial incentives...	
Energy bill	Applies (bill is higher due to intense use of dwelling)
Cost for NZEB-renovation	
Return on investment	
<b>Social and behavioural</b>	
Renovation needs & intentions	Applies, need for family dwelling. Need to increase

	comfort level.
Decision making	
Advice, unburdening & guidance	Specific guidance
Awareness of energy savings potential	
Information	
Momentums	Applies as driver (need to modify dwelling to make it suitable for family; buy a new dwelling to renovate)
General knowledge level	
Group action	Applies, as the homeowners have the same profile
Availability of time	Applies as barrier: limited time available due to intensive household phase
Values & attitudes	Applies (on average more aware of energy saving)
<b>Context</b>	
Split-incentive barrier	
Legislation & policy	
Multi-stakeholder issues	
Building sector readiness	

### Solutions applicable for the segment “Young Families”

*Table 8 Demand aggregation solutions for the segment “Young Families”*

Critical succes factors of demand aggregation schemes:	Comment – Applies to segment
Independent advice -no conflict of interest or commercial motives colour the advice	Applies
Renovation coaching – reducing the hassle and burdens of a renovation	Very relevant for this segment, because limited time to manage renovation project
Energy saving - the result will save energy and hence money	Relevant due to high energy bill
Government involvement	Applies
Independent decisions	Applies
Peer pressure – the scheme was organized in a way that peer pressure can play its role	Applies
Ambassadors – peers conveying the message instead of external experts	Applies
Non-financial incentives for homeowners	Applies
Financial incentives and solutions for homeowners	Applies
Personal and tailor-made approach	Applies
Targeted recruitment – not general awareness campaigns but specific approaches	Relevant – approach for specific profile of segment
<b>Successful techniques to counter drop-out moments:</b>	
A personal approach to create confidence between homeowner and the renovation guide.	Applies
Creating some kind of “communities” with other participants,	Applies
To offer a long-term perspective, e.g. being present in a neighbourhood for multiple years.	Applies
To have a toolkit of solutions and knowledge to (help) to respond to all barriers that pop up.	Applies
Not too limited to technical guidance, but integrated advice.	Applies
Good communication, especially in more complex situation.	Applies
A meticulous planning of the construction work.	Applies

### 3.3.2 Segment 2: “Post-war suburbs with detached houses”: main drivers & barriers

The homogeneity of dwellings, their poor thermal performance and general urgency for renovation makes this a high-potential segment. However, energy renovation is expensive, and the changing homeownership makes it more difficult: the “old” owners have too short a perspective to start renovation, and “new” owners have limited renovation budget. This segment offers opportunities to create a “renovation dynamic” in the neighbourhood.

This segment faces important technical drivers such as the **urgency for renovation**, emerging inconveniences and defects etc. to integrate energy renovation with. An important financial barrier in this segment is the **high cost for NZEB-renovation and the unfavourable return on investment** for detached houses, but also the limited budget of new homeowners that already spent most of their budget to buy the house.

The **renovation needs and intention** to increase comfort level, cosiness, personalization, taste, adjust architectural concept and so forth are drivers. The change of homeownership creates the right momentum, and there is a clear potential for **neighbourhood action** (group action).

#### Drivers and Barriers applicable to the segment “Post-war suburbs with detached houses”

*Table 9 Drivers and Barriers for the segment “Post-war suburbs with detached houses”*

Driver and Barriers Cluster categories	Comment – Applies to segment
<b>Technical</b>	
Urgency for renovation	Applies: these houses are approaching their first renovation cycle as they are >35 years old (need technical upgrading of installations, windows...)
Availability of tailor-made approach	Applies: construction type and dwelling type usually is very homogeneous
Inconveniences & defects	It may apply that there are a lot of inconveniences, depending on the quality of the dwellings
Inconvenience linked to the renovation	
Technical possibilities	Applies: construction type and dwelling type usually is very homogeneous
<b>Financial.</b>	
Financial possibilities to invest	Depends on the owner. There is a generation-shift, and new (young) owners can have limited budgets to renovate as prices can be high to buy a dwelling.
Feel secure about investment	
Willingness to invest / competing products	Depends on the owner. The original (older) owner is less interested to invest (considers this as for the future owner when one day he will sell the dwelling.
Subsidies, financial incentives...	
Energy bill	Applies: usually high (pre energy standards)
Cost for NZEB-renovation	Applies: usually high (detached houses)
Return on Investment	Applies: can be unfavourable in this type of neighborhood's
<b>Social and behavioural</b>	
Renovation needs & intentions	Applies, when there is a change in ownership: these houses need to be upgraded to contemporary standards

Decision making	
Advice, unburdening & guidance	
Awareness of energy savings potential	
Information	
Momentums	Applies, if there is a generation shift (if original owners sell), then the buy-moment is a good renovation-moment.
General knowledge level	
Group action	Applies: renovation dynamics and group actions can be generated (high potential)
Availability of time	
Values & attitudes	If generally populated with older owners: old values are a barrier
<b>Context</b>	
Split-incentive barrier	
Legislation & policy	
Multi-stakeholder issues	
Building sector readiness	

### Solutions applicable for the segment “Post-war suburbs with detached houses”

*Table 10 Demand aggregation solutions for the segment “Post-war suburbs with detached houses”*

Critical succes factors of demand aggregation schemes:	Comment – Applies to segment
Independent advice -no conflict of interest or commercial motives color the advice	
Renovation coaching – reducing the hassle and burdens of a renovation	
Energy saving - the result will save energy and hence money	Applies
Government involvement	
Independent decisions	
Peer pressure – the scheme was organized in a way that peer pressure can play its role	Applies (peers from neighborhood – seeing and to be seen)
Ambassadors – peers conveying the message instead of external experts	Applies (ambassadors from neighborhood)
Non-financial incentives for homeowners	
Financial incentives and solutions for homeowners	
Personal and tailor-made approach	
Targeted recruitment – not general awareness campaigns but specific approaches	Applies: good selection of high potential neighbourhood is essential
<b>Successful techniques to counter drop-out moments:</b>	
A personal approach to create confidence between homeowner and the renovation guide.	
Creating some kind of “communities” with other participants,	Applies – neighbourhood-community
To offer a long-term perspective, e.g. being present in a neighbourhood for multiple years.	Applies – neighbourhood-community
To have a toolkit of solutions and knowledge to (help) to respond to all barriers that pop up.	
Not too limited to technical guidance, but integrated advice.	
Good communication, especially in more complex situation.	
A meticulous planning of the construction work.	

### 3.3.3 Segment 3: “Empty nesters”: main drivers & barriers

These homeowners typically are 45-65 years old, and the grown-up children have left the house: the nest is empty now. They need to remodel the house to their new future needs. They are aware of environmental issues, they have more time and more financial possibilities to manage a renovation project. With empty nesters, energy investments do not necessarily need to be integrated with other planned renovations. The momentum is very important here.

An interesting subsegment are the empty nesters living in a terraced house (cf. segment 4).

Empty nesters don't face particular technical drivers & barriers. The segment has financial drivers, as there is a larger availability of **financial possibilities** to invest. Also, their housing needs are changing so they have **renovation needs or even intentions**. They have **time available** to manage a renovation project. These empty nesters need to be tackled at the moment they are planning their remodelling: this is the window of opportunity (**momentum**).

Drivers and Barriers applicable to the segment “Empty nesters”

*Table 11 Drivers and Barriers for the segment “Empty nesters”*

Driver and Barriers Cluster categories	Comment – Applies to segment
<b>Technical</b>	
Urgency for renovation	Applies: very often is a deep renovation not very urgent from technical perspective
Availability of tailor-made approach	
Inconveniences & defects	
Inconvenience linked to the renovation	
Technical possibilities	
<b>Financial</b>	
Financial possibilities to invest	Applies: more financial possibilities
Feel secure about investment	
Willingness to invest / competing products	Applies: often willing to invest their financial means
Subsidies, financial incentives...	
Energy bill	On an average a lower energy bill due to less intensive home occupation pattern (and less intensive energy use pattern)
Cost for NZEB-renovation	
Return on investment	Applies: as a deep renovation is technically often not very urgent, high energy savings can expected to be limited.
<b>Social and behavioural</b>	
Renovation needs & intentions	Applies: adapt dwelling to new situation (children left the dwelling)
Decision making	
Advice, unburdening & guidance	Specific guidance
Awareness of energy savings potential	
Information	
Momentums	Applies: it is difficult to recognize a “pattern” in this momentum: it is unpredictable what will trigger the decision for renovation (e.g. financial windfall)
General knowledge level	
Group action	Applies, as the homeowners have the same profile
Availability of time	Applies: time available to manage a renovation project (much more than young families)
Values & attitudes	
<b>Context</b>	
Split-incentive barrier	

Legislation & policy	
Multi-stakeholder issues	
Building sector readiness	

### Solutions applicable for the segment “Empty nesters”

*Table 12 Demand aggregation solutions for the segment “Empty nesters”*

<b>Critical succes factors of demand aggregation schemes:</b>	
Independent advice -no conflict of interest or commercial motives colour the advice	Applies
Renovation coaching – reducing the hassle and burdens of a renovation	Applies
Energy saving - the result will save energy and hence money	Applies less
Government involvement	Applies
Independent decisions	Applies
Peer pressure – the scheme was organised in a way that peer pressure can play its role	Applies – homogeneity of segment
Ambassadors – peers conveying the message instead of external experts	Applies
Non-financial incentives for homeowners	Applies
Financial incentives and solutions for homeowners	Applies
Personal and tailor-made approach	Applies
Targeted recruitment – not general awareness campaigns but specific approaches	Applies
<b>Succesfull techniques to counter drop-out moments:</b>	
A personal approach to create confidence between homeowner and the renovation guide.	Applies
Creating some kind of “communities” with other participants,	Applies
To offer a long-term perspective, e.g. being present in a neighbourhood for multiple years.	Applies
To have a toolkit of solutions and knowlegde to (help) to respond to all barriers that pop up.	Applies
Not too limited to technical guidance, but integrated advice.	Applies
Good communication, especially in more complex situation.	Applies
A meticulous planning of the construction work.	Applies

### **3.3.4 Segment 4: “terraced houses with an energy bill of >€180/month”: main drivers & barriers**

Terraced houses generally represent an older part of the building stock with high energy saving potential, and often in homogeneous neighbourhoods. A high energy bill indicates a high energy saving potential. Due to their age, these terraced houses need renovation (structural, architectural, comfort and style, inconveniences and defects). The cost for NZEB-renovation is lower than for other dwelling types. In homogeneous neighbourhoods, very similar solutions can be applied and a renovation dynamic can be created.

This segment faces particular technical drivers - such as more urgency for renovation, e.g. because of more frequent inconveniences and defects - and barriers such as limited potential for renewables (ground heat pumps, solar energy), or complex facade insulation when the external wall borders the limits of the plot. But the cost for NZEB-renovation is lower in comparison with detached and semi-detached houses, and the return on investment is better, especially because the energy bill is over €180/month. Very often with terraced houses a neighbourhood action is possible.

### Drivers and Barriers applicable to the segment “Terraced houses with an energy bill of > £180/month”

*Table 13 Drivers and Barriers for the segment “Terraced houses with an energy bill of > £180/month”*

Driver and Barriers Cluster categories	Comment – Applies to segment
<b>Technical</b>	
Urgency for renovation	Applicable: older part of building stock
Availability of tailor-made approach	Applicable: number of technical solutions will be limited
Inconveniences & defects	Applicable: older part of building stock
Inconvenience linked to the renovation	
Technical possibilities	Applicable: limited possibilities for renewables and e.g. isolation of facade.
<b>Financial</b>	
Financial possibilities to invest	
Feel secure about investment	
Willingness to invest / competing products	
Subsidies, financial incentives...	
Energy bill	Applicable, is high
Cost for NZEB-renovation	Applicable, will be higher than average due to poor current energy performance
Return on investment	Applicable, is favourable with terraced houses
<b>Social and behavioural</b>	
Renovation needs & intentions	Might be a barrier if homeowner has no specific needs or intentions
Decision making	
Advice, unburdening & guidance	
Awareness of energy savings potential	
Information	
Momentums	
General knowledge level	
Group action	Applies, as the dwellings can be in same neighborhood
Availability of time	
Values & attitudes	
<b>Context</b>	
Split-incentive barrier	
Legislation & policy	Applies, e.g. regulations on heritage, external insulation of facade...
Multi-stakeholder issues	
Building sector readiness	

### Solutions applicable for the segment “Terraced houses with an energy bill of > £180/month”

*Table 14 Demand aggregation solutions for the segment “Terraced houses with an energy bill of > £180/month”*

Critical success factors of demand aggregation schemes:



Independent advice -no conflict of interest or commercial motives color the advice	
Renovation coaching – reducing the hassle and burdens of a renovation	
Energy saving - the result will save energy and hence money	Applies
Government involvement	
Independent decisions	
Peer pressure – the scheme was organized in a way that peer pressure can play its role	Applies, neighbourhood action is possible
Ambassadors – peers conveying the message instead of external experts	Applies, neighbourhood action is possible
Non-financial incentives for homeowners	
Financial incentives and solutions for homeowners	
Personal and tailor-made approach	
Targeted recruitment – not general awareness campaigns but specific approaches	Applies
<b>Successful techniques to counter drop-out moments:</b>	
A personal approach to create confidence between homeowner and the renovation guide.	
Creating some kind of "communities" with other participants,	Applies, neighbourhood action is possible
To offer a long-term perspective, e.g. being present in a neighborhood for multiple years.	
To have a toolkit of solutions and knowledge to (help) to respond to all barriers that pop up.	Applies, focused set of solutions for this type of dwelling
Not too limited to technical guidance, but integrated advice.	
Good communication, especially in more complex situation.	
A meticulous planning of the construction work.	

### 3.3.5 Segment 5: "convinced energy savers": main drivers & barriers

This is a small segment of potential pioneers and frontrunners, essential to start a transition towards NZEB-renovation, to be followed by other homeowners. They have the right environmental values, the right attitude and good experience, and are willing to invest in NZEB. But they might have a low perspective on energy saving, and may lack the certainty needed to take the decision for NZEB-renovation. They are the first ones to meet all kinds of barriers.

An interesting sub segment are the idealistic rebuilders with a technical background.

Convinced energy savers have the willingness and intention to invest in energy efficiency, have the right attitude and feel secure about the investment. They do not have high expectations on return on investment, so that is not a major barrier. However, with their ideas, they face resistance in legislation & policy, which is not always ready, and operate in a conservative building sector which prefers to sticks with ancient building standards.

Drivers and Barriers applicable to the segment "Convinced Energy savers"

*Table 15 Drivers and Barriers for the segment "Convinced Energy savers"*

Driver and Barriers Cluster categories	Comment – Applies to segment
<b>Technical</b>	
Urgency for renovation	Can be a barrier, if no other renovations than energy renovation is necessary.
Availability of tailormade approach	

Inconveniences & defects	Can be a barrier, if no other renovations than energy renovation is necessary.
Inconvenience linked to the renovation	
Technical possibilities	Might be limited due to already implemented energy saving measurements. Risk for lock-ins.
<b>Financial</b>	
Financial possibilities to invest	Can be a barrier
Feel secure about investment	Applies, these homeowners feel secure about an investment in energy efficiency
Willingness to invest / competing products	Applies, these homeowners choose for an investment in energy efficiency instead of competing products
Subsidies, financial incentives...	Not main driver
Energy bill	Not main driver, might be low already due to already implemented energy saving measurements
Cost for NZEB-renovation	Not main barrier
Return on investment	Not main driver
<b>Social and behavioral</b>	
Renovation needs & intentions	Can be a barrier, if there are no other renovations needs than energy renovation.
Decision making	Can make decisions that differ from 'the general standard'
Advice, unburdening & guidance	Specific guidance
Awareness of energy savings potential	Applies, is main driver
Information	Have good access to information
Momentums	
General knowledge level	Good knowledge level on energy efficiency
Group action	
Availability of time	Applies: more willing to make time available to manage a renovation project
Values & attitudes	Applies, is main driver
<b>Context</b>	
Split-incentive barrier	
Legislation & policy	
Multi-stakeholder issues	
Building sector readiness	Might encounter a lot of resistance in building sector to realise their ideas (e.g. find craftsmen with right skills)

### Solutions applicable for the segment "Convinced Energy savers"

*Table 16 Demand aggregation solutions for the segment "Convinced Energy savers"*

<b>Critical success factors of demand aggregation schemes:</b>	
Independent advice -no conflict of interest or commercial motives colour the advice	Applies
Renovation coaching – reducing the hassle and burdens of a renovation	Applies, important to put their ideas and values in practice
Energy saving - the result will save energy and hence money	Less relevant
Government involvement	
Independent decisions	
Peer pressure – the scheme was organized in a way that peer pressure can play its role	
Ambassadors – peers conveying the message instead of external experts	These homeowners can become ambassador, to convince other segments
Non-financial incentives for homeowners	Applies
Financial incentives and solutions for homeowners	Applies
Personal and tailor-made approach	Applies

Targeted recruitment – not general awareness campaigns but specific approaches	Applies
<b>Successful techniques to counter drop-out moments:</b>	
A personal approach to create confidence between homeowner and the renovation guide.	Applies
Creating some kind of "communities" with other participants,	Applies
To offer a long-term perspective, e.g. being present in a neighborhood for multiple years.	Applies
To have a toolkit of solutions and knowledge to (help) to respond to all barriers that pop up.	Applies
Not too limited to technical guidance, but integrated advice.	Applies
Good communication, especially in more complex situation.	Applies
A meticulous planning of the construction work.	Applies

### 3.3.6 Overview of Segment vs. Drivers and Barriers

**Legend:** +: driver - : barrier +/-: can be driver or barrier **Nothing:** does not particularly apply for this segment (but off course can apply for parts of this segment)

Table 17 Comprehensive overview of segment vs. drivers, barriers and Demand Solutions

	Young families	Post-war suburbs with detached houses	Empty nesters	Terraced houses with high energy bill	Convinced energy savers
<b>DRIVERS &amp; BARRIERS</b>					
<b>Technical</b>					
Urgency for renovation		+	-	+	-
Availability of tailor-made approach		+		+	
Inconveniences & defects		+		+	-
Inconvenience linked to the renovation	-				
Technical possibilities		+		+	-
<b>Financial</b>					
Financial possibilities to invest	-	+/-	+		-
Feel secure about investment					+
Willingness to invest / competing products	-	+/-	+		+
Subsidies, financial incentives...					
Energy bill	+	+	-	+	-
Cost for NZEB-renovation		-		-	
Return on investment		-	-	+	
<b>Social and behavioural</b>					
Renovation needs & intentions	+	+	+	-	-
Decision making					+
Advice, unburdening & guidance	+		+		+
Awareness of energy savings potential					+
Information					+
Momentums	+	+	+/-		
General knowledge level					+
Group action	+	+	+	+	
Availability of time	-		+		+
Values & attitudes	+	+/-			+
<b>Context</b>					
Split-incentive barrier					
Legislation & policy				-	
Multi-stakeholder issues					
Building sector readiness					-
<b>SOLUTIONS</b>					
<b>Critical success factors of demand aggregation schemes:</b>					
Independent advice -no conflict of interest or commercial motives colour the advice	+		+		+
Renovation coaching – reducing the hassle and burdens of a renovation	+		+		+
Energy saving - the result will save energy and hence money	+	+		+	
Government involvement	+		+		
Independent decisions	+		+		
Peer pressure – the scheme was organised in a way that peer pressure can play its role	+	+	+	+	
Ambassadors – peers conveying the message instead of external experts	+	+	+	+	+
Non-financial incentives for homeowners	+		+		+
Financial incentives and solutions for homeowners	+		+		+
Personal and tailor-made approach	+		+		+
Targeted recruitment – not general awareness campaigns but specific approaches	+	+	+	+	+
<b>Successful techniques to counter drop-out moments:</b>					
A <b>personal approach</b> to create confidence between homeowner and the renovation guide.	+		+		+
Creating some kind of “communities” with other participants,	+	+	+	+	+
To offer a <b>long-term perspective</b> , e.g. being present in a neighbourhood for multiple years.	+	+	+		+
To have a <b>toolkit of solutions and knowledge</b> to (help) to respond to all barriers that pop up.	+		+	+	+
Not too limited to technical guidance, but <b>integrated advice</b> .	+		+		+
<b>Good communication</b> , especially in more complex situation.	+		+		+
A <b>meticulous planning of the construction work</b> .	+		+		+

## 4 Key findings from the supply side Mapping

In Supply Side Mapping (WP3) of the REFURB project the supply side of the dwelling renovation market has been analysed. The key findings and methods of the work, especially the work carried out in the report “Energy efficiency solutions per housing type” (D3.2) will serve as basis for the analysis in this report and are briefly summarized in the sections below.

A mapping of available and near available solutions for renovation to NZEB, **both technological and non-technological**, has been carried out. **Technological solutions** are defined as measures related to the improvement of the building performance, whereas **non-technological solutions** are understood to be measures relating to financial, communicative or process aspects.

Table 18 shows the defined categories of the technological and non-technological solutions which will be used as basis for the matrix overview of supply solutions vs. Demand drivers in this report.

*Table 18 The categories of technological and non-technological solutions defined in work package 3.2*

SOLUTIONS FOR RENOVATION TO NZEB	
<b>NON-TECHNOLOGICAL SOLUTIONS</b>	New ways of financing
	Online management tools
	New approaches to organising the supply side
	Quality assurance
	One-stop-shop-solutions
<b>TECHNOLOGICAL SOLUTIONS</b>	Building envelope
	Technical installations
	Renewable energy sources

In the next sections the main findings within the solutions categories listed in Table 18 is described.

### 4.1 NON TECHNICAL SUPPLY FINDINGS

One of the main conclusion of is that **Non-technological solutions are more important than the technological solutions to seduce homeowners to renovate to NZEB.**

The non-technological solutions are categorized as:

- New ways of financing,
- Online managements tools,
- New approaches to organising the supply side,
- Quality assurance, and
- One-stop-shop-solutions.

The key findings of each analysed element is shortly recapped in the following sections and are all based on country input for the participating countries in the REFURB project.

#### 4.1.1 New ways of financing

Suppliers of **attractive, new, financial services linked to energy saving are in general missing in the market**. General financial solutions are available to the homeowner, but specific financial products effectively linked to energy savings or specifically aimed at NZEB renovations are not widely offered, there are however front runners in the market with building blocks for financial solutions such as the KredEx fund in Estonia. In “Energy efficiency solutions per housing type” (D3.2) it is concluded that **more cooperation between builders and financiers to provide integrated guarantees and services is needed**.

#### 4.1.2 Online managements tools

Online management tools are considered important in the decision-making process for the homeowner and must be addressed by the supply side. This topic will be looked in into in more detail in the report “Online customer tool and market approach” (D4.5).

#### 4.1.3 New approaches to organising the supply side

The supply side is traditionally very diverse and fragmented. This acts as a disincentive to more cooperation which is needed to provide good holistic and deep renovations.

There is a **limited demand for good holistic and deep renovations which provides insufficient incentive for the industry to reorganise and provide one stop shop services**. No full packages are offered and contractors only do their part, without taking into account that a good deep or NZEB renovation requires such a good coordination.

This means that the majority of building sector actors of the supply side needs to generate their income from selling single, or at least a limited number of energy saving measures which in the long run is more expensive for the homeowner.

**Government or local participation can act as an incentive to encourage one-stop-shop services**. Where government gets involved locally, or neighbourhoods organize collective demand, this does provide an incentive for building firms to improve their services towards offering a better supply. The trust element created by the involvement of the government (at least at local level) can create demand and motivates the building firms to participate and improve their services. Involvement of the government, also costs money to the government. So, it is more sustainable to encourage the supply side itself to get better organised towards the homeowners. A follow up on this topic will be carried out in the report “supplier involvement strategy” (D3.3).

#### 4.1.4 Quality assurance

Many quality assurance schemes are available for individual measures and for general building measures but **quality assurance aimed for good holistic and deep renovations for energy related measures are not or hardly available**. There are some attempts to implement schemes. The key issue here is that quality assurance measures are available for the physical quality of work carried out, but not for the long term effect of the work on energy use. Even the testing of the physical work after completion is inadequate. This is certainly an area where improvement is necessary.

#### 4.1.5 One stop shop (Renovation packages)

Especially one-stop-shop-solutions<sup>3</sup> seem to be important for the homeowners. A one-stop-shop or a renovation package consists of a holistic set of technological solutions and non-technological solutions.

The common characteristics of a good holistic one-stop-shop-solutions contain some or all of the following non-technological elements:

- Targeting **individual homeowners**.
- Initiative from government or supply side.
- **Personal approach** of the homeowner.
- **Tailored masterplan** is offered to the homeowner.
- **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.

The **chosen segment determine which supply solutions are relevant to offer in a one-stop-shop concept and also in some cases the country context determine the success of one-stop-shop solutions**. For example, the organisation of the different building actors in a specific country can make it more or less easy to work together in one team and offer a complete one-stop-shop concept.

The **advice** offered by the one-stop-shop-solution has to **include an integrated masterplan to avoid lock-ins** by executing the renovation in a logical sequence that enable following steps to renovation to NZEB in a **stepwise renovation**. This is especially important when doing a staged renovation.

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<sup>3</sup> For the purpose of this project the term '**renovation package**' or '**one-stop-shop-solution**' is meant to be: *"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."*

## 4.2 TECHNOLOGICAL SUPPLY FINDINGS

The technological supply findings consist of three main elements as described in the report “Energy efficiency solutions per housing type” (D3.2).

- The country context and market
- Technological supply categories
- Housing segments

The key findings of each analysed element is shortly recapped in the following sections and are all based on country input for the participating countries in the REFURB project.

### 4.2.1 Country context and market

A clear understanding of the local conditions is required in order to estimate the replication potential of renovation packages. This includes a summary of the national policy and the professional building context which each country works under. An overview of the building sector market per country is made available and presented in Annex 2 in the report “Energy efficiency solutions per housing type” (D3.2) and from this the key market segments relevant for further analysis can be identified.

### 4.2.2 Technological supply categories

The technical supply solutions have been divided into 3 main categories:

- The building envelope
- The technical installations
- The renewable energy solutions (RES)

Innovative solutions for each category are included and have carefully been selected based on the country reports and outputs presented in Annex 1 of in the report “Energy efficiency solutions per housing type” (D3.2). The solutions described are all available on the market or are close to market introduction.

The 3 overall categories of the technical supply solutions are used as the basis for the combination matrix illustrated in this report. The full generic technology vs. Housing segment is illustrated in section 3.2.4 of this report including the identification of specific product categories needed to reach a NZEB standard.

### 4.2.3 Housing segments

The housing segments have been divided into 4 generic categories. These generic categories result from a segmentation for each country.

The generic categories are:

- SFH – detached
- SFH- semi-detached
- SFH – terraced
- MFH

The full generic technology vs. Housing segment is illustrated in section 3.2.4 of this report.



## 4.2.4 The Technology vs. Houses segments matrix

Table 19 Generic technology vs. Houses segment matrix developed in D3.2

### Legend

0 = default (solution not relevant for this typology)

1 = low relevance or difficult to apply;

2 = medium relevance and

3 = high relevance or easy to apply;

		Building typologies				
		Generic				
		SFH - detached	SFH - semi-detached	SFH - terraced	MFH	
Technical solutions	Building Envelope	Improving air tightness	2	2	2	2
		Eliminating thermal bridges	2	2	2	3
		Thermal mass	1	1	1	2
		Insulation of flat roof	3	3	3	2
		Insulation of sloped roof	3	3	3	2
		External insulation	3	3	2	3
		Core insulation	2	2	2	1
		Interior insulation	1	1	1	1
		Super insulating materials (SIMs)	1	1	1	2
		(Re)placement of windows and doors (incl. frame)	3	3	3	3
		Replacement of high-performance glazing (excl. frame)	3	3	3	3
		Super insulating glazing	3	3	3	3
		Solar shades	2	2	2	3
		Insulation of floor on soil	3	3	3	2
		Insulation of floor bordering unheated space	3	3	3	2
	Technical installations	Replace heat generator with condensing boiler	3	3	3	1
		Hybrid heat-pump	3	3	3	1
		Optimize distribution/piping system	2	2	2	3
		Replace individual with collective heating system	0	0	0	3
		Integrate DHW in condensing combi-boiler	3	3	3	1
		Drain water heat recovery	2	2	2	2
		Heat pump for DHW	1	1	1	2
		Exhaust air mechanical ventilation system	3	3	3	3
		Mechanical ventilation system	3	3	3	1
		Mechanical ventilation system with heat recuperation	3	3	3	1
	LED lighting	3	3	3	3	
	Renewable Energy Sources (RES)	PV panels	3	2	2	3
		Thermal Collector for DHW	3	2	2	3
		Thermal Collector for DHW and heating	3	2	2	3
		PVT solar collectors	3	2	2	3
		Heat pump (air/air)	3	2	2	3
		Heat pump (air/water)	3	2	2	3
		Heat pump (soil/water)	2	1	0	2
Heat pump (water/water)		2	1	0	2	
Biomass		2	2	2	3	
Micro CHP		1	1	1	3	
Wind turbine		1	1	1	2	
Connection with DHC		1	1	1	2	
Connection with smart grid		1	1	1	2	

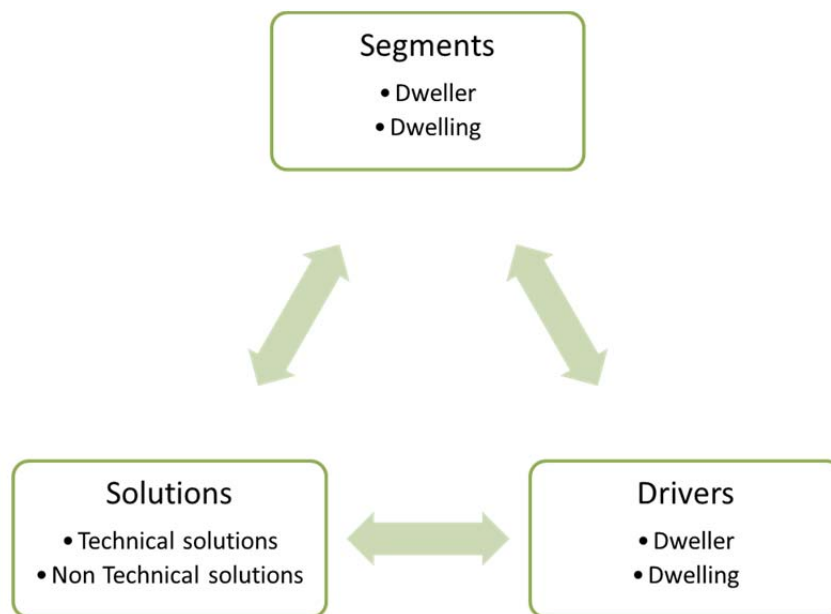
# 5 Supply vs. Drivers Matrix

## 5.1 MATRIX FUNDAMENTALS

The first step towards combining the supply and demand side is to acknowledge that the combination has three related sides consisting of:

- Segments: The Segments are groups of dwellings and/or dwellers that have similar characteristics and meet similar barriers and drivers.
- Drivers: The Drivers are drivers and barriers of homeowners to decide on NZEB-renovation.
- Solutions: The technical and non-technical solutions to realize the energy reduction in the residential sector.

The interplay between Segments, Drivers and Solutions is illustrated in Figure 6 and is the input to the matrix developed in this report.



*Figure 6 The relationship between Segments, Drives and Solutions*

In order to comprehend the information from a multi-layered 3-sided input, it is useful to keep one side fixed. The segment definition is the main element and by locking this to one parameter by choosing a specific dweller and/or dwelling, it is possible to analyse the solutions and drivers for the chosen segment in a matrix structure. This is illustrated in the next section where the drives vs. solutions matrix is presented.

## 5.2 DRIVERS VS. TECHNOLOGICAL SOLUTIONS MATRIX

The drivers vs. solution matrix is created by adding the key driver clusters identified in the demand side mapping analysis (D2.2) and the innovative technological and Non-technological solutions identified in the supply side mapping analysis (D3.2).

The matrix has two axes: The technical solutions along the vertical axis, and the drivers along the horizontal axis.

In order for the matrix to be useful one must choose a segment for which to make the analysis. It is important to note that the matrix presented in the following sections is a generic matrix, where the functionality is illustrated by means of the 5 generic high potential segments.

The matrices, presented in the following sections, have been filled out by highlighting the relevant drivers and solutions for the specific segment by using a colour identification scheme. Information on the drivers and the demand aggregation scheme solutions has been abstracted from the tables in section 2.3 "Mapping segmentation vs. drivers". Based on this and the knowledge of the segment characteristics the technological and non- technological solution has also been evaluated and filled out using a colour identification scheme. Hereafter, the first primary connection points between Drivers and Solutions, have visually been identified by looking at the matrix and the findings have been summarized in three bullets in the middle of the matrix.

A traditional "filling out" of the matrix has been evaluated, however it was found less valuable for this generic analytic level.

### 5.2.1 Solution vs. Driver Matrix for Segment "Young Families"

Table 20 Drivers vs. Solutions Matrix illustrated for the Young family segment.

		Drivers and Barriers																												
		Technical				Financial				Social and Behavioural				Context																
Solutions	Technological	Building Envelope	Urgency for renovation	Viability of stepwise approach	Inconveniences and defects	Inconveniences linked to the renovation	Technical possibilities	Financial possibilities for investment	Feel secure to invest	Willingness to invest / competing products	Subsidies and financial incentives ect.	Energy bill	Cost for NZEB renovation	Return on investment	Renovation need and intentions	Decision making	Advice unbundling and guidance	Awareness of energy saving potential	Information	Momentum	General knowledge level	Group action	Availability of Time	Values and attitudes	Split incentive barrier	Legislation and policy	Multi-stakeholder issues	Building sector readiness		
		Technical installations	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Renewable Energy Sources	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
	Non-technological	New ways of financing	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Online management or decision making tools	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		New approaches to organising the supply side	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Quality assurance	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
	Demand aggregation schemes	Renovation packages or "One stop shop solutions"	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Independent advice	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Renovation coaching	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Energy Saving	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Government involvement	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Independent decisions	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Peer pressure	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Ambassadors	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Non-financial incentives	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Tailor made approach		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
Targeted recruitment	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green		

**Instructions:**

- Choose and identify your segment. Either dweller and/or dwelling (WP2.1) for which you wish to analyse the present drivers and barriers vs. available solutions.
- Fill out the matrix by indicating relevance of solution and driver in the green spaces. Use the color system system below, leave the space in light green in case of "not relevant". **Red = barrier/low relevance**, **Green = driver/high relevance**, **Yellow = can be both a driver and a barrier/medium relevance**
- Analyse the picture and write a concluding summery consisting of max. 3 bullets

**NB: Adapt the matrix to specific local conditions by:**

- Insert your local identified drivers (WP2.2) on the horizontal axis
- Insert your local technical solutions (WP3.2) on the vertical axis

**DWELLING SEGMENT: Not Defined**  
**DWELLER SEGMENT: Young Family**

**Summary:**

- 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 standard.
- Largely driven by Social and Behavioral elements, energy saving matters = **need easy tailor made approach** and renovation coaching which **speaks to values & attitudes**.

5.2.2 Solution vs. Driver Matrix for Segment " Post-war suburbs with detached houses

Table 21 Drivers vs. Solutions Matrix illustrated for the Post-war suburbs with detached houses segment

		Drivers and Barriers																										
		Technical				Financial				Social and Behavioural				Context														
<p><b>Instructions:</b></p> <p>1. Choose and identify your segment. Either dweller and/or dwelling (WP2.1) for which you wish to analyse the present drivers and barriers vs. available solutions.</p> <p>2. Fill out the matrix by indicating relevance of solution and driver in the green spaces. Use the color system system below, leave the space in light green in case of "not relevant". <b>Red = barrier/low relevance</b>, <b>Green = driver/high relevance</b>, <b>Yellow = can be both a driver and a barrier/medium relevance</b></p> <p>3. Analyse the picture and write a concluding summary consisting of max. 3 bullets</p> <p><b>NB: Adapt the matrix to specific local conditions by:</b></p> <p>1. Insert your local identified drivers (WP2.2) on the horizontal axis</p> <p>2. Insert your local technical solutions (WP3.2) on the vertical axis</p> <p><b>DWELLING SEGMENT: Post War Subs.</b></p> <p><b>DWELLER SEGMENT: Not Defined</b></p>		General Driver (dwelling)	Urgency for renovation	Viability of stepwise approach	Inconveniences and defects	Inconveniences linked to the renovation	Technical possibilities	Financial possibilities for investment	Feel secure to invest	Willingness to invest / competing products	Subsidies and financial incentives ect.	Energy bill	Cost for NZEB renovation	Return on investment	Renovation need and intentions	Decision making	Advise unbundling and guidance	Awareness of energy saving potential	Information	Momentum	General knowledge level	Group action	Availability of Time	Values and attitudes	Split incentive barrier	Legislation and policy	Multi-stakeholder issues	Building sector readiness
			Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Solutions	Category	Solution	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
	Technological	Building Envelope	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Technical installations	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Renewable Energy Sources	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	Non-technological	New ways of financing	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Online management or decision making tools	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		New approaches to organising the supply side	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Quality assurance	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
	Demand aggregation schemes	Renovation packages or "One stop shop solutions"	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Independent advice	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Renovation coaching	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Energy Saving	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Government involvement	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Independent decisions		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
Peer pressure		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
Ambassadors		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
Non-financial incentives		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Tailor made approach		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Targeted recruitment	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		<p>Summary:</p> <p><b>Dominated by technical drivers</b> but the investment cost is a barrier = <b>need for new ways of financing</b> and cost reduction.</p> <p><b>Urgency for Renovation = staged renovation</b> offer needed due to cost barrier and to avoid lock ins and to reach the NZEB standard.</p> <p>Have a <b>high potential for energy saving</b> and react to group action = need <b>New approaches for organizing the supply</b> solutions including the use of peer pressure and targeted recruitment.</p>																										

### 5.2.3 Solution vs. Driver Matrix for Segment "Empty nesters"

Table 22 Drivers vs. Solutions Matrix illustrated for the Empty Nesters segment

		Drivers and Barriers																													
		Technical				Financial				Social and Behaviourial				Context																	
<p><b>Instructions:</b></p> <p>1. Choose and identify your segment. Either dweller and/or dwelling (WP2.1) for which you wish to analyse the present drivers and barriers vs. available solutions.</p> <p>2. Fill out the matrix by indicating relevance of solution and driver in the green spaces. Use the color system below, leave the space in light green in case of "not relevant". <b>Red = barrier/low relevance</b>, <b>Green = driver/high relevance</b>, <b>Yellow = can be both a driver and a barrier/medium relevance</b></p> <p>3. Analyse the picture and write a concluding summary consisting of max. 3 bullets</p> <p><b>NB: Adapt the matrix to specific local conditions by:</b></p> <p>1. Insert your local identified drivers (WP2.2) on the horizontal axis</p> <p>2. Insert your local technical solutions (WP3.2) on the vertical axis</p> <p><b>DWELLING SEGMENT: Not Defined</b></p> <p><b>DWELLER SEGMENT: Empty Nesters</b></p>		General Driver (dwelling)	Urgency for renovation	Viability of stepwise approach	Inconveniences and defects	Inconveniences linked to the renovation	Technical possibilities	Financial possibilities for investment	Feel secure to invest	Willingness to invest / competing products	Subsidies and financial incentives ect.	Energy bill	Cost for NZEB renovation	Return on investment	Renovation need and intentions	Decision making	Advise unbundling and guidance	Awareness of energy saving potential	Information	Momentums	General knowledge level	Group action	Availability of Time	Values and attitudes	Split incentive barrier	Legislation and policy	Multi-stakeholder Issues	Building sector readiness			
		Category	Solution	Red	Green	Green	Green	Green	Green	Green	Green	Green	Red	Red	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green		
		Solutions	Technological	Building Envelope	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
				Technical installations	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
				Renewable Energy Sources	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
			Non-technological	New ways of financing	Red	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
				Online management or decision making tools	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
				New approaches to organising the supply side	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
				Quality assurance	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
				Renovation packages or "One stop shop solutions"	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
			Demand aggregation schemes	Independent advice	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
				Renovation coaching	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
		Energy Saving		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Government involvement		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Independent decisions		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	
		Peer pressure		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Ambassadors	Green	Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green		
Non-financial incentives	Green	Green		Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green		
Tailor made approach	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green			
Targeted recruitment	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green			
		Summary:	<p><b>No urgency for renovation</b> = time to explore <b>Online tools</b>, gather information and make sure <b>the Quality Assurance</b> is in place</p> <p><b>Have Money and Time</b> available and will like to feel confident about the renovation before they go all the way to a NZEB standard = <b>Staged renovation</b> guided with <b>independent advice</b> and expert <b>Renovation coaching</b></p> <p><b>Low energy bill</b> due to low occupancy makes the ROI a barrier = persuade through <b>Targeted recruitment</b>, <b>Peer pressure</b> and <b>Ambassadors schemes</b></p>																												

5.2.4 Solution vs. Driver Matrix for Segment " Terraced houses with a high energy bill"

Table 23 Drivers vs. Solutions Matrix illustrated for the Terraced Houses with a high energy bill segment

		Drivers and Barriers																												
		Technical				Financial				Social and Behavioural				Context																
<p><b>Instructions:</b></p> <p>1. Choose and identify your segment. Either dweller and/or dwelling (WP2.1) for which you wish to analyse the present drivers and barriers vs. available solutions.</p> <p>2. Fill out the matrix by indicating relevance of solution and driver in the green spaces. Use the color system system below, leave the space in light green in case of "not relevant". <b>Red = barrier/low relevance</b>, <b>Green = driver/high relevance</b>, <b>Yellow = can be both a driver and a barrier/medium relevance</b></p> <p>3. Analyse the picture and write a concluding summary consisting of max. 3 bullets</p> <p><b>NB: Adapt the matrix to specific local conditions by:</b></p> <p>1. Insert your local identified drivers (WP2.2) on the horizontal axis</p> <p>2. Insert your local technical solutions (WP3.2) on the vertical axis</p> <p><b>DWELLING SEGMENT: Not Defined</b></p> <p><b>DWELLER SEGMENT: Terraced houses</b></p>		General Driver (dwelling)	Urgency for renovation	Viability of stepwise approach	Inconveniences and defects	Inconveniences linked to the renovation	Technical possibilities	Financial possibilities for investment	Feel secure to invest	Willingness to invest / competing products	Subsidies and financial incentives ect.	Energy bill	Cost for NZEB renovation	Return on investment	Renovation need and intentions	Decision making	Advise unbundling and guidance	Awareness of energy saving potential	Information	Momentums	General knowledge level	Group action	Availability of Time	Values and attitudes	Split incentive barrier	Legislation and policy	Multi-stakeholder issues	Building sector readiness		
		Solutions	Technological	Building Envelope																										
				Technical installations																										
				Renewable Energy Sources																										
			Non-technological	New ways of financing																										
				Online management or decision making tools																										
				New approaches to organising the supply side																										
				Quality assurance																										
			Demand aggregation schemes	Renovation packages or "One stop shop solutions"																										
				Independent advice																										
				Renovation coaching																										
				Energy Saving																										
				Government involvement																										
				Independent decisions																										
				Peer pressure																										
				Ambassadors																										
Non-financial incentives																														
Tailor made approach																														
Targeted recruitment																														
		<p>Summary:</p> <p>Dominated by technical drivers = need for <b>New approaches to organizing the supply side</b> providing targeted solutions.</p> <p><b>Urgency for renovation and motivation of a lower energy bill = Renovation packages</b> in a one stop shop or a <b>staged approach</b> depending on the economic situation of the segment.</p> <p>The <b>legislation and Policy</b> might be a barrier due to regulations on heritage and limitations on external insulation of facade = need for <b>Government involvement</b>.</p>																												

### 5.2.5 Solution vs. Driver Matrix for Segment " Convinced energy savers

Table 24 Drivers vs. Solutions Matrix illustrated for the **Convinced Energy Savers** segment

		Drivers and Barriers																							
		Tecnical				Financial				Social and Behaviourial				Context											
<p><b>Instructions:</b></p> <p>1. Choose and identify your segment. Either dweller and/or dwelling (WP2.1) for which you wish to analyse the present drivers and barriers vs. available solutions.</p> <p>2. Fill out the matrix by indicating relevance of solution and driver in the green spaces. Use the color system system below, leave the space in light green in case of "not relevant". <b>Red = barrier/low relevance</b>, <b>Green = driver/high relevance</b>, <b>Yellow = can be both a driver and a barrier/medium relevance</b></p> <p>3. Analyse the picture and write a concluding summery consisting of max. 3 bullets</p> <p><b>NB: Adapt the matrix to specific local conditions by:</b></p> <p>1. Insert your local identified drivers (WP2.2) on the horizontal axis</p> <p>2. Insert your local technical solutions (WP3.2) on the vertical axis</p> <p><b>DWELLING SEGMENT: Not Defined</b></p> <p><b>DWELLER SEGMENT: Convinced E. Savers</b></p>		General Driver (dwelling)																							
		Urgency for renovation	Viability of stepwise approach	Inconveniences and defects	Inconveniences linked to the renovation	Technical possibilities	Financial possibilities for investment	Feel secure to invest	Willingness to invest / competing products	Subsidies and fianacial incentivs ect.	Energy bill	Cost for NZEB renovation	Return on investment	Renovation need and intentions	Decision making	Advise unburdening and guidance	Awareness of energy saving potential	Infomation	Momentums	General knowledge level	Group action	Availability of Time	Values and attitudes	Split incentive barrierer	Legislation and policy
Category	Solution																								
Solutions	Technological	Building Envelope																							
		Technical installations																							
		Renewable Energy Sources																							
	Non-technological	New ways of financing																							
		Online management or decision making tools																							
		New approaches to organising the supply side																							
		Quality assurance																							
		Renovation packages or "One stop shop solutions"																							
	Demand aggregation schemes	Independent advice																							
		Renovation coaching																							
		Energy Saving																							
		Government involvement																							
		Independent decisions																							
		Peer pressure																							
		Ambassadors																							
Non-financial incentives																									
Tailor made approach																									
Targeted recruitment																									
		<p><b>Summary:</b></p> <p><b>First mover segment</b> driven largely by <b>Social and Behavioral</b> elements where <b>Awareness of energy saving potential</b> is a main driver = <b>Quality assurance</b> and <b>online decision making tools</b> are relevant solutions.</p> <p><b>Feel secure and are willing to invest</b>, but do not have the financial possibilities = <b>New ways of financing</b> are important solutions.</p> <p>Technically the building might not need a renovation which makes the <b>business case for energy saving difficult</b> = Focus on <b>Non- financial incentives</b> and <b>Targeted recruitment</b> solutions as this group will</p>																							

## 6 Conclusion and Recommendations

A generic matrix template has been derived, which systematically illustrates the connection points between supply and demand.

The functionality of the matrix is illustrated through the 5 generic high potential segments identified in D.2.1 and provides valuable insight to the further development towards a compelling renovation offer.

A summary of the primary identified connection points for each segment is described in the following section.

### 6.1 TOP 3 DRIVERS AND SOLUTIONS CONNECTIONS

The top 3 drivers and Solutions identified for the 5 high potential segments are:

#### Young families

*Table 25 Top 3 drivers and matching solutions for 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 standard
Largely driven by Social and Behavioural elements, energy saving matters	Need easy tailor made approach and renovation coaching which speaks to values & attitudes.

#### Post-war suburbs with detached houses

*Table 26 Top 3 drivers and matching solutions for 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.



## Empty nesters

*Table 27 Top 3 drivers and matching solutions for 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

## Terraced houses with a high energy bill

*Table 28 Top 3 drivers and matching solutions 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

## Convinced energy savers

*Table 29 Top 3 drivers and matching solutions for 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

## 6.2 RECOMMENDATIONS

It is important to emphasize that the identifications of the primary connections at this point only is a **justified evaluation** of which solution best matches the identified drivers, based on the research carried out in the REFURB project. The conclusions will serve as the platform for the production of a minimum variable product, i.e. a prototype of a Renovation Package, consisting of the first compelling offer. As emphasised in the method description, it foreseen that many iterations for this work is necessary and the method recommended for this phase is the Lean Startup method by Eric Ries<sup>4</sup>.

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<sup>4</sup> Ries, E. (2011). *The Lean Start Up method*. Crown Business. Available at: <http://theleanstartup.com/>