



Deliverable D4.5

Online customer tool and market approach

GA N° 649865

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Dissemination level	Public

January 2018



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Version	Date	Author	Description
1.0	5-7-2017	Yovko I. Antonov/Michal Pomianowski	Template draft
2.0	9-11-2017	Yovko I. Antonov/Michal Pomianowski	Adjusted comments from PZ
3.0	05-09-2017	Yovko I. Antonov/Michal Pomianowski	Updated template report – inputs from Belgium and Germany; national tool templates integration
4.0	14-11-2017	Yovko I. Antonov/Michal Pomianowski	Updated template report – comments from VITO included; inclusion of description of Leidal tool
5.0	12-12-2017	Yovko I. Antonov/Michal Pomianowski	Updated template report – updated content of chapter 4.2 and 5.2
6.0	22-01-2017	Yovko I. Antonov/Michal Pomianowski	Updated template report – Language corrections
7.0	26-01-2017	Yovko I. Antonov/Michal Pomianowski	Updated template report – incorporation of new updated templates with Belgian tools and final review

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2 Summary

Work Package 4 from the REFURB project aims at bridging the gap between supply and demand of deep energy renovation and entices investments in energy efficiency. This is done by providing a specifically designed “compelling offer”, developed in D4.4, to the well-defined, single-family house owner segment, defined in D4.2.

The “compelling offer” consists of a set of technical and non-technical renovation solutions, which has to be delivered to the customer in a non-aggressive, convincing and trustworthy manner. It has to ensure the market uptake of the “compelling offers” by inspiring homeowners to invest in energy-efficient renovation solutions.

The delivery of the “compelling offer” to homeowners is to be done, among others, by online tools, which fulfil the above-mentioned criteria. The focus of this report is to define a framework and design structure for such tool. Secondly, the development of such tool was also recognized as one of the deliverables. Within the scope of the REFURB project was developed a tool ‘My Energy Compass’ that is presented in detail in chapter 6 of this report. What is more, as there are already many tools supporting energy renovation, the participating partner countries have agreed to screen the locally available tools. This is done with the purpose of establishing the state of the tools, their functionality and placement throughout the customer journey.

A generic method to all involved partners is applied when collecting the necessary information. It consists of questionnaires, designed to evaluate and compare different parameters of the tools, as well as locate the tool intended use on the customer journey.

The collected feedback from all participating partners is synthesized in short analysis for each tool. The purpose is to analyse typical existing renovation support tools in order to:

- Identify strengths and weaknesses
- Identify typical input and output parameters
- Identify scope, user friendliness & availability
- Use the obtained knowledge to develop new tools for uptake of renovation packages
- Identify which steps of the customer journey tool supports

The analysed tools are divided in two main typologies: descriptive tools and calculation tools. Descriptive tools are tools in any form (website, newspaper, brochure etc.) that relay the information regarding energy renovation to the homeowners in structured manner. Calculation tools refer to web or desktop based calculation software that provides quantitative information regarding renovation improvement, return of investment, cost calculation, etc.

The general outcome of the analysis is that the tool situation in the partner countries is good. This is because there are many tools from which to choose. Descriptive tools in all countries seem to be numerous, they are typically well designed and user friendly. Despite that, it has been 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 is still variety of tools, the level of information required to perform a meaningful calculation varies greatly. To sum up, it seems that 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.

3 Introduction

3.1 BACKGROUND AND LINK TO PREVIOUS DELIVERABLES

Deep renovations of the buildings in the residential sector towards Nearly Zero Energy Buildings (NZEB) are lagging behind the European political ambitions for energy renovation. The overall REFURB project focuses on bringing forward solutions to solve the complex interplay between the supply side and the demand side of an NZEB renovation and bring forward “an offer you can’t refuse” solutions targeting the residential sector.

Previous REFURB reports have documented and described the supply and demand side of an NZEB renovation. The reports “**Demand – Supply Combinations**” (**Deliverable 4.1**) with “**Local Tailoring**” (**Deliverable 4.2**) included analyses of the first steps towards bridging the gap between supply and demand, including also in-detail description of the overall framework, methods and approach with the main local segments, drivers and solutions so as to reach a compelling offer for the homeowner.

Deliverable 4.3 – “Supportive financial constitutions” investigates and presents suitable financing constitutions for uptake of renovation packages in all partner countries. The challenges and available financial mechanisms for the two chosen segments of single- and multi-family houses are linked to renovation packages presented in Deliverable D4.4 - “Renovation packages”.

One of the main findings in deliverable D4.3 is that there is a gap between financial institutions and/or incentives and homeowners. The gap in this case should be understood as the house owner not knowing what the financial institutions are able to offer in terms of financing energy renovation of houses. On the other hand, financial institutions might represent a lack of flexibility and financial offers customized for energy renovation of buildings. Reducing this gap within the customer journey could reduce the amount of dropouts, thus ensuring higher numbers of renovated buildings. Furthermore, by linking both the available financial incentives with tailored renovation packages, the homeowner would be presented with an overview of not only the energy related savings due to renovation but also related to financial long- and short-term benefits. An example could be tax benefits over period of time, governmental support, low interest rates for loans etc.

Online tools can be great platform for reduction of the above-mentioned gap. By linking the tailored renovation packages to supportive financial constitutions in an online customer tool, the homeowner would be able to get an overview of possible case-specific financial benefits resulting from the renovation or financing possibilities.

The obtained renovation packages in Deliverable 4.4 have to be presented to homeowners and interested stakeholders in a manner that inspires the customer to renovate while, at the same time, help them to understand the renovation process.

A large amount of work within the area of tools supporting renovation is already done and available on the market in various forms. Analysis and review of some of the most commonly used tools in each participating partner country is part of this deliverable. This is done in order to identify common strengths and weaknesses of the available tools. The knowledge obtained by the analysis is then used throughout the design and development process of the new tool for market uptake of the renovation packages.

3.2 CONSTITUTING THE COMPELLING OFFER

“Constituting the compelling offer” is the main title of work package 4 (WP4) of the REFURB project. The core objective of WP4 is to **combine findings and information derived in other REFURB work packages**. Through systematic analysis and iterative steps, the complexity of the area is untangled, and WP4 will provide an overview of general and specific solution clusters for “an offer you can’t refuse” for the residential building sectors. WP4 consists of the following deliverables, where this report is deliverable 4.5 (D4.5):

- 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 other work packages and deliverables relative to WP4 is available in the report “Demand – supply combinations” (Deliverable 4.1)

3.3 SCOPE

According to the partner agreement, Deliverable D4.4 should deliver the following:

1. Parameters and design structure for navigation system/roadmap towards renovation, which should be attractive and easy for customers to understand, despite their background. Such navigation system/roadmap should provide non-technical answers for homeowners in relation to description of technological benefits, return on investment, comfort level and cost savings after provision of the customer's needs (e.g. financial capacity, age and type of the house, desired comfort level, etc.).
2. Online tool providing the navigation system/roadmap to homeowners.

3.4 DEFINITIONS

The term "tool(s)" is often used in this D4.5 Report and is to be understood as either descriptive or calculation software, website, brochure, newsletter, etc. which supports the demand side (a house owner).

Descriptive tool means any form of information that can be obtained by the homeowner in one or another way, and it relates to and/or supports one or more of the steps in the customer journey. This could be in the form of website, brochure, forum, specialized newspaper or magazine, etc.

Calculation tool refers to web or desktop based calculation software that provides quantitative information. This could be various parameters regarding energy use or demand, payback time, CO₂, water and/or fuel savings, etc. In some of the cases, it is observed that both types are present under the same tool. In such cases, the tool is categorized based on if the larger share of the tool function is descriptive or calculation.

The support that tools provide to the above-mentioned stakeholders on the demand side can be in a number of ways. Depending on the user of the tool and his/hers technical knowledge, the tool may provide general information regarding renovation, possible renovation actions, guidance in execution of chosen actions, help on finding finances, etc.

4 Analysis of Available Tools

Due to the large number of existing descriptive and calculation tools, this chapter will only present and elaborate on selected tools.

4.1 EVALUATION OF EXISTING TOOLS

This report is based on the results from the questionnaire approach, developed by Aalborg University, and conducted in three of the partner countries. The questionnaires are split into two main categories referring to either descriptive or calculation tools, where each questionnaire was filled out by the partner countries. The collected feedback is summarized taking into account previous deliverables within WP4.

The overall goal of the questionnaires is to provide information on the function of the current tools and at which stage of the customer journey each of the tools supports homeowners. The result of the questionnaire will provide the knowledge base for evaluating the need for new tools for market uptake.

4.2 DESCRIPTION OF SCREENED TOOLS

The following section provides a short description of each screened tool. A screen shot and translation in English are included for some of the tools. This is done to give the reader an idea of what to expect when using such tools.

4.2.1 Spareenergi.dk

This free website, www.spareenergi.dk, is exceptionally rich of useful information if one wishes to energy renovate one's house. The quality of information is very high and, at the same time, language and presentation are in a non-technical form, which makes it easier for people to understand. The information is provided with easy-to-understand language, examples, good advices, illustrations and energy and money saving potential. Moreover, the information is divided into several categories depending on what one wishes to work with.

The tool includes guidelines depending on if one wishes to renovate a house or an apartment. A particularly good tool available on www.spareenergi.dk is the building guide with 15 most typical building typologies gathered and described. Each building typology is provided with guidelines on possible renovation solutions, and energy and economy saving potentials.



Figure 1. Some of the options available in the "Save Energy tool".

4.2.2 Byggerienergi.dk

The quality of information provided in this free website, www.byggerienergi.dk, is considered high. The provided solutions are of great value and can be applied to specific renovation projects. Solutions are sorted with respect to houses/apartments, then to envelope and systems and then to specific constructions and components. The tool includes an interface to filtrate the information of interest. The output is provided in form of PDF documents available online and to download. The site also includes a number of checklists that guide the house owner through checking his/her house condition and compare it with recommendations from present building regulations and good practice. Moreover, the site includes recent building legislations, educations within energy in buildings, inspirations from renovation cases, technical compendiums such as "The little blue book", "Technical assignments", useful links and guide movies. The tool is constructed so that its level can be adjusted for private house owners, public employees and industrial employees.

4.2.3 Boligejer.dk

This tool, www.boligejer.dk, includes sorted and formulated information, synthesized in an easy-to-follow guide on how to build, rebuild or renovate the house. The guide is based on the best practice information and provides the house owner with an essential knowledge he/she should be aware of before starting the project. The tool also includes guides about the selling and buying procedure, which is irrelevant to this report and REFURB project. In addition, the tool provides guidelines about financial planning and commissioning of the executed work. Therefore, some of the information in the tool might be very useful at the later stage of the renovation process.

4.2.4 Besparelsesberegner

This voluntary, free tool – www.besparelsesberegner.sbi.dk – provides calculations of energy and cost saving. The required input is the used resources for heating before renovation, e.g. quantity of burned oil or gas, or the number or kWh of district heating. Furthermore, insulation properties of construction elements, building installations and window properties before renovation must be provided. There is an option for integrating renewable energy systems, which in this case is limited to heat pumps and solar collectors.

Behind the tool stands the “Knowledge centre for energy saving in buildings”. The centre collects and distributes specific and practical knowledge on possibilities to reduce energy in buildings. The centre is the organization working under the Danish Energy Agency. The tool is based on Danish energy performance compliance tool *Be15*, which is used to calculate the compliance of the energy frames of a building with respect to the Danish Building Regulation. The target users are homeowners, but it could also be used by bank employees to estimate cost saving potential for operating the building before granting the loan for energy renovation.

Bygningsdata

Bygningstype: Parcelhus

Byggeår: 1970

Etageareal: 130 m²

Antal etager: 1 plan

Kælder: Ingen

Orientering: 0 grader

Antal beboere: 4

Opvarmning og energipriser

Primær opvarmning: Primary heating

Energipris, kr/liter olie: Energy price - oil

Suppl. opvarmning: Ingen

Suppl. brændsel: Brænde, løv, rummeter (m³)

El-pris, kr./kWh: El. price

Parcelhus

Antal etager: Du skal angive antal etager over jord.

Kælder: Hvis du vælger en opvarmet kælder skal arealet ikke være medtaget i etagearealet.

Energipriser: Hvis du ikke kender den nøjagtige energipris, kan du bruge følgende standardpriser:

Gas	7,25 kr./m ³
Olie	9,50 kr./liter
Fjernvarme	600,00 kr./MWh
Fjernvarme	26,00 kr./m ³
Træpiller	2000 kr./ton
El	2,30 kr./kWh
El (varme)	1,65 kr./kWh

Antal etager: 1 plan, 1½ plan, 2 etager, 2½ etage

Figure 2 Screenshot from the Besparelsesberegner “Savings Calculator”- first page (Building Data).

4.2.5 Husetsweb

Husetsweb (<http://modstroem.husetsweb.dk/>) is a free webpage that can perform energy saving calculations and is aimed at private homeowners. The electric provider Modstrøm is the creator of the tool. In order to obtain output, it is necessary to provide bills and meter usage for the last year for heating, electricity and water. The tool focuses more on electricity saving and “low hanging fruits”. For example, it takes into account the energy rating of the electricity consuming equipment, such as washing machine, fridge, lamps. It also provides estimate solution for installation improvement and envelope thermal improvement (although envelope elements are roughly considered). In general, the user can obtain energy and cost savings, building label, investment cost estimate, payback time and information regarding financing costs.

4.2.6 Husets energiberegner

Two tools are available on this free web page (www.beregner.husetsenergi.dk) – one for houses and one for summerhouses. In order to obtain a result, the user needs to provide either energy use for heating, electricity and water use or yearly cost. In general, the obtainable output is cost savings, estimate of the investment cost for renovation and payback time, as well as approximation of the CO₂ reduction. The tool provides multiple feedback to what could be improved in the building. Improvements range from larger investments, e.g. envelope thermal improvement to small “low hanging fruits” improvements such as new circulation pump. The tool does not provide direct calculation of renewable energy, but such are incorporated in the calculation.

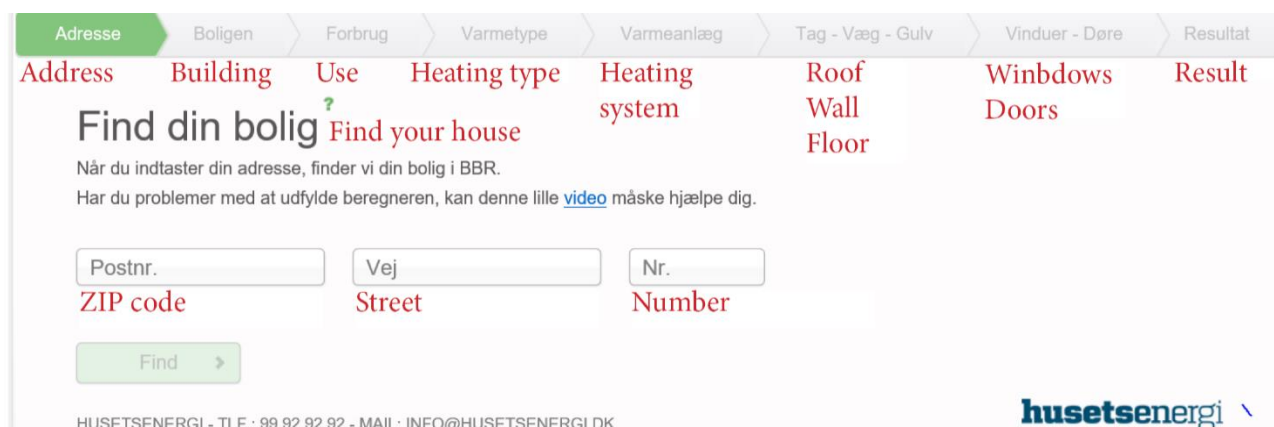


Figure 3. Screenshot from start page of Husetsenergi.

4.2.7 Ren2BEN

The *Ren2BEN* tool (www.warmerwonen.be/renben/) is developed within the RenBEN project, which is subsidized by the Flemish Government. The tool is an application for renovation coaches with minimal technical skills. It can be used on site (in the house) to get the best renovation advice for each component (roof, wall, floor, windows, heating, ventilation or renewable energy) of the house by answering a series of questions with Yes/No. It can be used a) to generate advice before the start of the renovation process, b) to get people interested in and informed about doing an NZEB renovation and c) to give them a starting point when they contact an architect or contractor to execute their renovation to NZEB.

The app works as follows:

- The renovation coach answers, through the app, a series of questions (by yes or no) for each component of the house and gets advice for the best solution for this component in a detailed description.
- The app sends these best solutions to the renovation coach in form of e-mail.
- The renovation coach can use these solutions to make a final overall advice for the homeowner.

4.2.8 Ecobouwers

The website of *Ecobouwers* (www.ecobouwers.be) is a Flemish independent website on sustainable living and building. It gives an excess of in-depth information on environmental and energy themes, as well as on NZEB renovation of houses. The user can find integrated calculation tools (e.g. CO₂ calculator) and some provided links to other calculation tools (e.g. Zonnekaart).

Homeowners with renovation or building plans and professionals can use this website to get more informed on sustainable building and living. A differentiation is made between information for homeowners, professionals and schools. The platform provides a forum for questions, open discussion and shared experiences, information on the yearly “Ecobouwers” Opening day as well as a list of construction professionals. Moreover, the user can find articles on building sustainability and energy conscious with in-depth information on certain techniques.

4.2.9 Premiezoeker

Premiezoeker is the official search engine of the Flemish Government to look up available grants and subsidies, including grants related to energy saving or renovation measures. It is available at: www.premiezoeker.be

4.2.10 Renovatiestarter

Renovatiestarter (www.renovatiestarter.be/) provides homeowners interested in renovating their homes with a comprehensive overview of possible renovation measures. Measures are categorized per building component: Building envelope (roof, wall, floor, windows & doors, airtightness) and technical installations (heating, domestic hot water, ventilation, renewable energy and sun shading). Each measure is explained in detail: Main advantages, points of attention and additional recommendations. Homeowners can select renovation measures and generate a report with overview of their selection.

4.2.11 Vind uw aannemer / Build your home

Vind uw aannemer (www.vinduwaannemer.be) and *Build your home* (www.buildyourhome.be) are both search engines used to find suitable contractors. The first is targeted to specialized contractors; the second is targeted to general contractors. There is an option to only search for “Energiebewuste aannemers” and “BEN aannemers” which translate to “Energy conscious contractors” and “NZEB contractor”, respectively.

4.2.12 Samen sterker

Samen Sterker is a platform which organizes group purchases of energy efficiency related products or renovation measures such as green energy, green vehicles, cavity wall insulations, PV panels, solar boilers etc. The actions targeted are local (for instance, the province of Antwerp), but there are actions organized in other regions as well.

<https://www.samensterker.be/>

4.2.13 Energie ID – “Energy ID”

Energie ID is an online platform in which users can enter their energy consumption figures on a regular basis. It is possible to automate this process by linking to a digital meter. Users can join groups to compare their consumption with the group’s average consumption. The platform is available at www.energieid.be/.

4.2.14 Bouwinfo / Livios

Bouwinfo (www.bouwinfo.be) and *Livios* (www.livios.be) are two internet forums. Both provide information about the building process. This is not limited to renovation but also applicable for new buildings. Participants can discuss building topics in the fora. The websites also include search engines for contractors or building products, financial information etc.

4.2.15 Check je huis

This is a voluntary tool, free of charge, which is provided by the city of Gent in cooperation with Digipolis (<https://klimaat.stad.gent/checkjehuis/>). The tool is targeted to homeowners and is capable of performing calculations, based on qualitative estimate of the building present energy consumption. The tool calculations are focused on insulation of the building envelope, windows and heating systems, while also capable of integrating green energy, photovoltaic and solar panels. The outputs from the calculation are: energy use and demand, investment and saving cost, CO₂ reduction and possible subsidies and grants.

4.2.16 Zonnekaart

The *Zonnekaart* (“Solar map”) is an online application made available by the Flemish Energy Agency (VEA). The tool targets mainly homeowners, but also owners of non-residential buildings such as SMEs, schools etc. The application can be accessed via www.energiesparen.be/zonnekaart and has the following features:

- Homeowners can look up their building and visualize it in a map viewer.
- The tool calculates the potential of the roof of the building for PV panels and solar thermal collectors based on the geometry of the building and solar radiation data. Homeowners only have to provide the address of their building in order to perform a calculation.
- Next, homeowners have the option to modify default settings according to their situation.
- The tool provides useful information for homeowners regarding investment costs, payback times, renewable energy production etc.
- The website generates a report, which includes useful information for further support (e.g. list of certified installers, available grants and loans, etc.)

4.2.17 Energiewinstcalculator

This free, voluntary tool is intended for everyone, but the main target audience is homeowners. The tool is easy to use and, depending on what the user would like to know, it asks for composition of the construction components. The provided information is energy and cost savings as well as calculation of the energy profit for each investment (insulation of pitched roof, cavity wall, installing high performance glass, installation of solar boiler in existing building and installation of solar panels). The tool focuses on specific renovation solutions and can be accessed via the link <http://www.energiesparen.be/energiewinst>.

4.2.18 BINE Information Service

This free of charge tool (www.energiefoerderung.info/) is intended for homeowners and provides detailed information subdivided by different regions of Germany. It allows specification of the search for funding opportunities by different filters like: new buildings, modernization, mobility. The recommended results can be further specified by, e.g.:

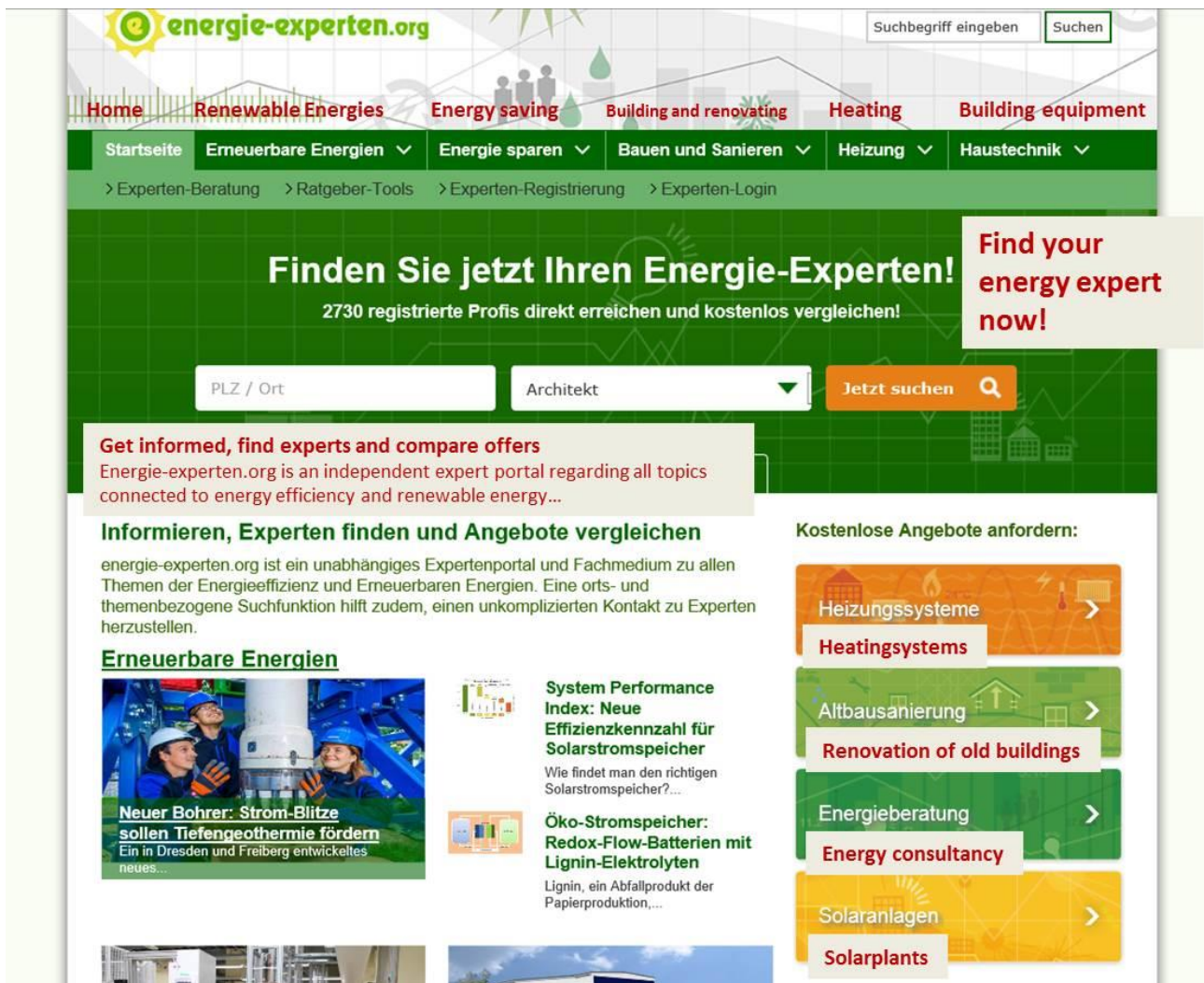
- Photovoltaic cells
- Energy-efficient domestic appliances

It is possible to gain specific and detailed information for each funding action. Furthermore, contact information and contact persons are available. The tool is user-friendly, intuitive and graphically pleasing. It also gives a great and detailed overview.

4.2.19 energie-experten.org

This is a website hosted by an editorial department and financed by placement of advertisements (www.energie-experten.org). It is a portal with extensive information on all topics regarding energy-efficient technologies and energy renovation. You can also start a search for experts (for a specific topic, e.g. new windows) in your region. Experts can register in order to connect with potential customers. There are several calculation applications integrated in the website. Those are for heating systems, for heat pumps, for solar energy, for electric heating, for insulation and one for windows.

The website is appropriate for private homeowners, but also for everybody interested in energy efficiency in general as there are other topics besides house-related topics discussed. The website could be more clearly arranged as it feels a little overloaded and the structure could be improved, but generally you find what you are looking for. The calculation parts are clearly arranged and mostly intuitive.



4.2.20 Energiesparen im Haushalt – „Energy saving in private households“

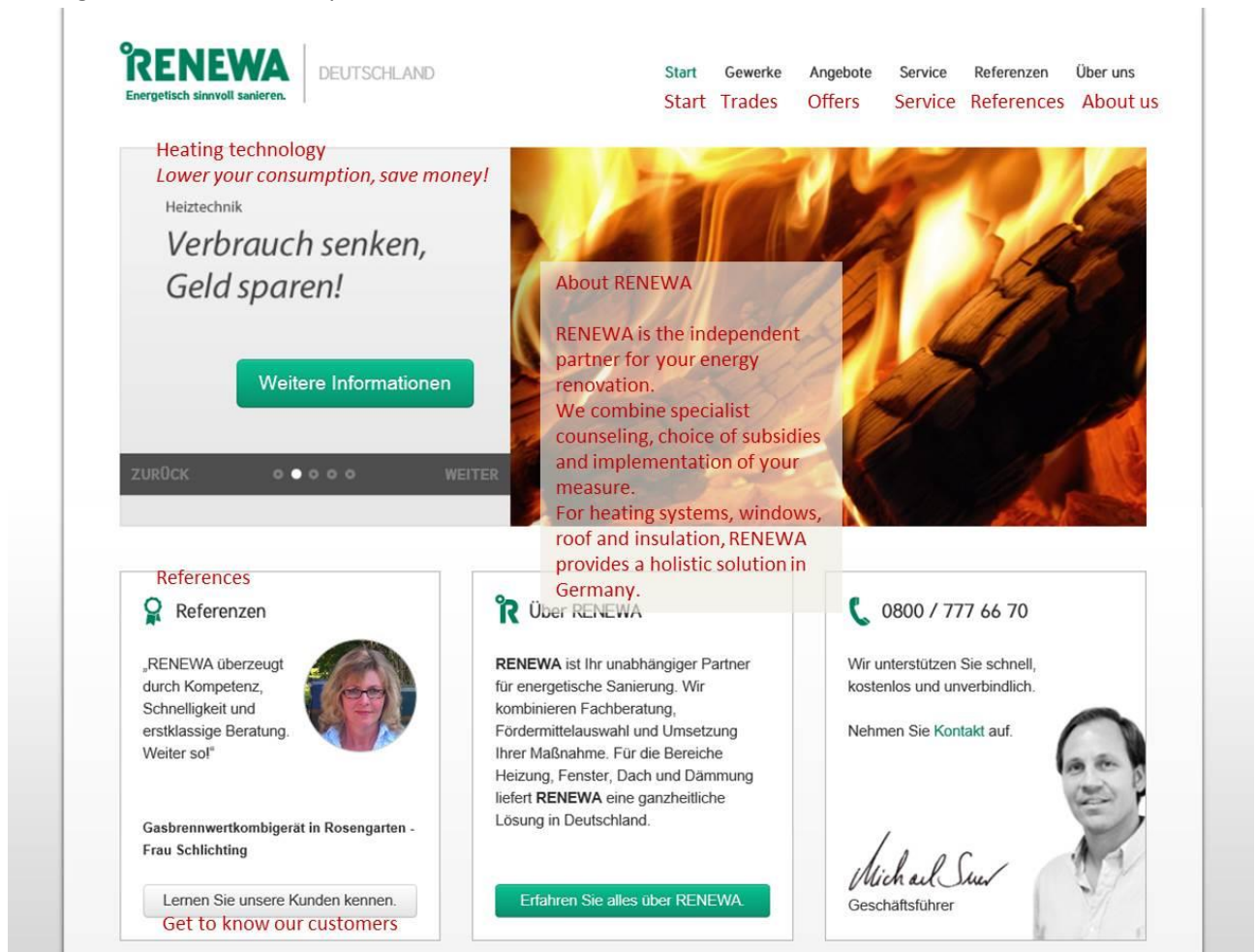
This tool is operated by the private company vPRESS. GmbH and can be accessed at the following link: <http://www.energiesparen-im-haushalt.de/energie/bauen-und-modernisieren/modernisierung-haus/altbauanierung.html>. The tool does not cost money to use but contains advertisements. It contains specific information about the modernization of old buildings. The tool is also well-structured and includes good examples. This tool does not include a calculation tool, although it contains some calculation examples so as to clarify specific aspects. It also refers to other tools and websites for further information.

The tool is user-friendly. It is intuitive in general, but the website is a little bit confusing. It is hard to form a general idea about the important information at the beginning because of advertisements. Despite that, the user can find some of the following information: Technical information targeted at homeowners, financial saving potential due to energy renovation, tips and hints on saving energy, etc.

4.2.21 RENEWA

RENEWA is a "one-stop-shop" company for energetic renovation with interesting business model (www.renewa.de). They offer energy renovation or single measures for a fixed price (heating,

windows, insulation, roof). The client can also book additional services like thermography, EPC, disposal of old heating system and economic feasibility study. The company operates throughout all stages of the renovation process



The screenshot shows the RENEWA DEUTSCHLAND website. The header includes the logo 'RENEWA DEUTSCHLAND' with the tagline 'Energetisch sinnvoll sanieren.' and a navigation menu with links: Start, Gewerke, Angebote, Service, Referenzen, Über uns, Start, Trades, Offers, Service, References, About us.

The main content area features a large image of a fireplace with a text overlay:

- Heating technology
- Lower your consumption, save money!
- Heiztechnik
- Verbrauch senken, Geld sparen!
- Weitere Informationen

Below this is a section titled 'References' with a testimonial from 'Frau Schlichting' and a photo of her. The testimonial reads: '„RENEWA überzeugt durch Kompetenz, Schnelligkeit und erstklassige Beratung. Weiter so!“'. Below the testimonial is a button: 'Lernen Sie unsere Kunden kennen. Get to know our customers'.

Next to it is a section titled 'Über RENEWA' with a photo of Michael Suw and a button: 'Erfahren Sie alles über RENEWA'. The text describes RENEWA as an independent partner for energy renovation, offering specialist counseling, choice of subsidies, and implementation of measures for heating systems, windows, roof, and insulation.

On the right, there is a contact section with the phone number '0800 / 777 66 70', the text 'Wir unterstützen Sie schnell, kostenlos und unverbindlich.', and a button: 'Nehmen Sie Kontakt auf.' Below this is a photo of Michael Suw, identified as 'Geschäftsführer'.

4.2.22 Zukunft Altbau

This is a free tool administered by the Climate Protection Agency of Baden-Württemberg, funded by the Ministry for Environment, Climate and Energy Economy of Baden-Württemberg (www.zukunftaltbau.de). The tool is informative, provides a good overview and is a starting point for different target groups such as homeowners, companies, municipalities and experts.

The user can find information on best practice, technical options, funding, consulting possibilities and events, as well as additional information for experts (news, legal news, events for experts). Some of the information is specialized for Baden-Württemberg only.

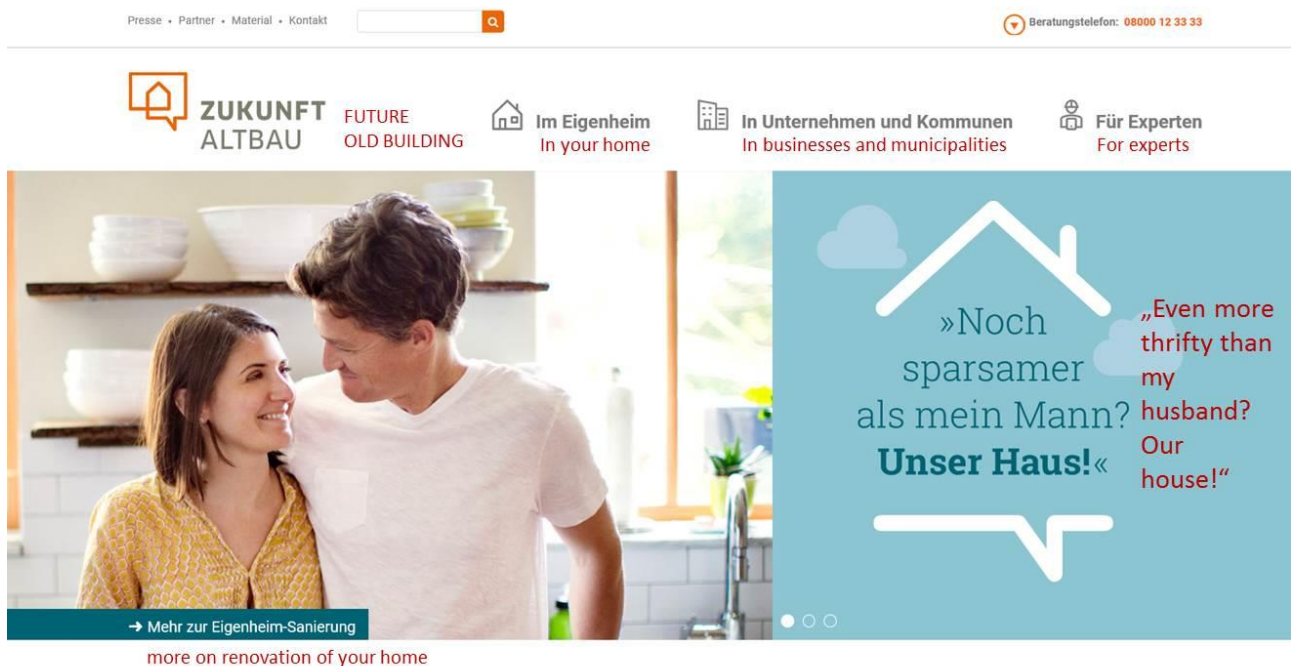
There is a download section with good and clearly arranged materials for homeowners, and it contains a good informational basis and checklists for the renovation process as well as current information on legal issues and funding options etc.

4.2.23 “Zukunft-Haus” (Future house); “Energieeffizienz-Expertenliste” (List of experts for energy efficiency)

The tool is run by the German Energy Agency (DENA), and it is free of charge for the user. It provides specific information for the planning process and offers advising information in the field of energy. Furthermore, it provides professional information about legislative issues and different actions for energy savings.

The tool is dedicated to a wide range of stakeholders. Private households as well as consultants and other stakeholders may use this tool. The tool mainly focusses on the initial and planning phase. Therefore, it provides detailed information and further links to other institutions and websites. It also contains information about legal aspects relevant to the renovation process.

Depending on what information the user requires, it may be necessary to provide some input. For example, for using the expert list, it is necessary to give information about the region and if you are eligible for funding. In case of using the databank for energy-efficient buildings, you are supposed to give information about the type of building, required kind of energy efficiency and if it is supposed to be renovated or not.



Gute Sanierungen sparen Energie

4.2.24 effizienzhaus-online

This is free webpage (<https://application.effizienzhaus-online.de/sanierungsrechner/#?state=0>), maintained by the company Bosch (Robert Bosch GmbH). The tool is voluntarily and it is targeted towards homeowners. This tool is capable of providing calculations for the following parameters: energy demand and savings, building label, cost savings and estimate of investment cost for renovation and payback time. In order to get those results, the user is required to input precise information about construction and installation components. The more detailed information is provided, the more precise the results. For some

of the information either ‘unknown’ can be chosen or an estimation can be made, but generally, it is better to be precise. Since it is a tool powered by Bosch, chances are that there is a (hidden) focus on heating systems.



BOSCH
Technik fürs Leben

Effizienzhaus-online
Einfach. Energie. Einsparen.

Heizung ▾ Sanierung ▾ Handwerker Konfigurator Förderung ▾ Aktuelles Anmelden Q

Die besten Partner für Ihre Sanierung. Find the best partners for your renovation.

Finden Sie Handwerker in Ihrer Region Find craftsmen in your region

PLZ oder Ort eingeben Dienstleistung wählen Q

Das Serviceportal für Ihre Sanierung **The Service-Portal for your renovation**

Sie planen eine energetische Sanierung für Ihr Haus, um Kosten zu senken und den Wohnkomfort zu erhöhen? You are planning to renovate your house to increase energy-efficiency, in order to lower your costs and increase comfort?


In vier Schritten gelangen Sie hier zur erfolgreichen Umsetzung!

So funktioniert's:
That's how it works:

1. Informieren
2. Sanierungsrechner nutzen
3. Förderung ermitteln
4. Handwerker finden

4.2.25 Sanierungskonfigurator

This tool is operated by the German Federal Ministry of Economy and Energy. It is free of charge and targeting homeowners. The tool can be accessed at www.sanierungskonfigurator.de/start.php, and requires inputs in order to perform calculation. The more detailed information is provided, the more precise the results. There are no options of choosing ‘unknown’ or estimations like good, average, poor. The tool is capable of calculating output for energy savings, energy demand, building label, cost savings, investment cost estimate and payback time. The tool provides the possibility for implementing renewable energy sources, although there is no specific focus on renovation work.



Bundesministerium
für Wirtschaft
und Energie

Federal Ministry of
Economy and Energy

Sanierungskonfigurator


State of the building
Renovation measures
Result

Gebäudezustand
Sanierungsmaßnahmen
Ergebnis


Gebäude
Gebäudehülle
Baukonstruktion
Heizung
Warmwasserbereitung
Verbrauchsdaten

Building
Building envelope
Construction
Heating
Warm water supply
Consumption data


Direkt angrenzendes Nachbargebäude
Adjacent building



freistehend




auf einer Seite direkt angrenzendes Nachbargebäude




auf zwei Seiten direkt angrenzende Nachbargebäude

Grundriss
Layout



kompakt



langgestreckt, gewinkelt, komplex


Baujahr
Year of construction

Bundesland
Federal state

Anzahl Vollgeschosse
Number of floors

Anzahl Wohneinheiten
Number of dwellings/units

[Weiter >](#)



Endenergiebedarf

0 125 >= 250

vor der Sanierung: kWh/m²a

Energiebedarf vor Sanierung
Bitte machen Sie zuerst alle Angaben zum Zustand des Gebäudes. Erst dann können erste Ergebnisse angezeigt werden.

4.3 CONCLUSIONS

In general, there are many tools available, almost too many, so it becomes difficult for homeowners to decide on which source to trust. The following summary is presented for each of the two identified types of tools, namely descriptive and calculation tools.

The overall impression after the review of descriptive tools is that the most of them are useful, well designed, intuitive and informative, but might seem overwhelming to the house owner, who is not specialized in energy in buildings. What is more, information is available in many sources, which might be confusing. The other important issue is that none of the reviewed tools provides a holistic approach. The advice on what to renovate is fragmented to single activity. The tools do not advice in which sequence renovation improvements to consider, for example to prioritize better indoor comfort, reduction in energy or increase in property value in order to obtain best energy improvement for money (energy/cost efficiency).

What is positive and valid for the most of the available tools is the fact that they are free of charge. This gives an opportunity for everyone considering energy renovation to obtain guidelines, consulting or possibility of a dialog with an expert in the field.

Concerning the calculation tools, it can be argued that the situation in Europe is good, at least in the initial stage when one considers renovation. However, it must be stressed that these simple on-line calculation tools do not provide holistic information on which activity to choose and how to obtain synergies if several renovation activities are to be performed.

Homeowners have to make their choice from which tool they want to receive their information. They can find tools and services online, but this requires determination. If they want to avoid this process, they can always choose to talk to an expert/energy consultant and be informed and advised.

Descriptive tools

There are many descriptive tools that provide extensive information on energy renovation, renewables, heating technologies, funding options, financing tips, help with finding experts, how to start the renovation process, how to carry out the renovation etc. The tools are easy to find, but it is hard to choose. Some of the descriptive tools are very rich in information, which can even result in a negative effect and scare potential homeowners from renovating. There is high risk that once entering the webpage one could feel overloaded with the number of possibilities, solutions, different good advises and, as such, drop the idea of energy renovation. On the contrary, what is very positive in some of the descriptive tools is the fact that they offer free of charge guideline/consulting for everyone considering energy renovation. That ensures the possibility to talk with an expert in the field and hear one's options. The quality of the personal consulting was not evaluated in the review process.

It is often difficult to evaluate if the information provided in the tool/pages is up to date or which motivation the tool/webpage provider has for providing the service (or who the provider even is). Therefore, there is a risk of mistrust if there are two different or contradicting recommendations.

A supporting overview page on the website could be useful, in order to help homeowners find the right page/tool for their needs. However, the page must stay non-commercial and not provide specific suppliers, advisors. The page could be developed around customer journey suggesting which descriptive tools (or in fact only parts of the tools) one should consider in which step of the journey. In that manner, the house owner will get to the information required straight-ahead. Such a common tool could be also used by energy consultants or trained craftsmen as a fast and efficient reference tool when holding a meeting with house owners.

Due to the large number of tools, this chapter only presents the selected tools, which were screened in-depth and elaborated on in details. The screened tools are also ones that could be recommended as good examples since they provide good quality, structured information, good advice on renovation, energy and money saving potentials as well as checklist and guides concerning renovation.

Calculation tools

In the screening of calculation tools, only tools available online were investigated. From the screening, it was concluded that there are many online calculation tools available to support energy renovation of private houses.

Most of the online tools are rather simple and it takes no more than few minutes to complete a calculation. These tools usually require few inputs and provide instantaneous results, meaning they are only able to provide general estimate and never tailored advice.

The aim of the tool is to indicate to the house owner if his/her house performs well energy-wise or if it requires only some or significant improvements to keep up with the present standards. Very often, the provided output is present energy rating versus possible-to-achieve energy rating if executing improvements. What is more, often these tools estimate cost saving with respect to before and after energy improvement.

Tools usually include the possibility to calculate “low hanging fruits” solutions, but also some major energy improvements. However, solutions are never detailed and results must be always considered as estimates.

Especially in cases where the tool is developed/funded by a private institution offering certain building product, the tool would focus only on renovation improvements related to this specific product. An example is the case with the “Rockwool” tool, which calculates energy savings only related to insulation. While this provides a good estimate of how much energy can be saved by insulating, it does not provide any other information or comparison regarding how much savings could be achieved by other renovation measures.

In practice, it is seldom or even almost never that house owners would use an online calculation tool to estimate energy saving potential. This could be due to many reasons, some of which could be trust in the validity of the tool, owners being uncertain of what input should be provided or simply what the input means. Another reason for that could be that the tool is too overwhelming; it either requires too many inputs or provides (too many) outputs not easily understandable. Therefore, the tool accompanying the house owners should be trustworthy with enough, but not have too much information and be able to be specifically tailored to their scenario. It should be also equipped with neat and user-friendly interface.

5 Role of Tools in the Customer Journey

This chapter reviews the online tools with respect to their role in the Customer Journey. Among other factors, the tools are screened to determine in which part of the Customer Journey they can be used.

The Customer Journey used in the REFURB project (Figure 4) is developed by the Dutch association of municipalities VNG and its partners. It includes 11 different phases that homeowners go through during energy renovation. Each of the stages is numbered, and they begin and end with the customer status.

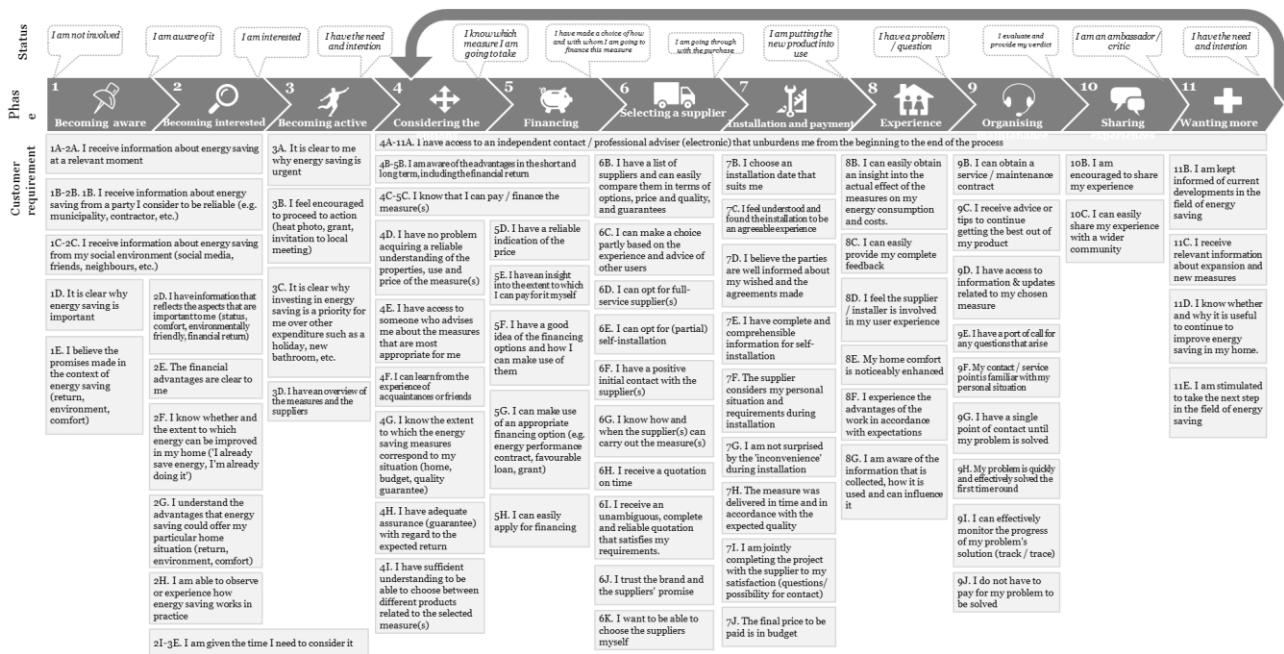


Figure 4: Customer journey related to energy renovation for homeowners. (Source: VNG)

Report D4.4.

- Step 1** Becoming aware – essential that the information is received by the homeowner at the relevant moment. A relevant moment being a renovation project, an addition to the family, or at a point in time when people have the motivation to invest, either by motivation or because of component breakdown.
- Step 2** Becoming interested – essential that a trusted party provides the information.
- Step 3** Becoming active – essential that the homeowners understand why they must act now.
- Step 4** Considering the offer – essential to have the value proposition and potentially connecting to a single-point of contact (advisor).
- Step 5** Financing – an indication of price and how to finance the investment are essential.

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

The different phases in the journey require different features from the tools. The majority of the screened tools covers only a part of the Customer Journey and leaves out the rest. This chapter presents a screening study including the evaluation of the steps covered by each of the analysed tools. This evaluation and location of tools on the Customer Journey map is done based on the contained information in the tools and the processes/phases included in each step. The analysis is done with the aim of understanding the state of existing tools, to evaluate if holistic tools for market uptake already exist and to identify which part of the Customer Journey is elaborated on the most and the least in the online tools.

The following example show the methodology applied throughout the screening process of the different tools. The tool selected because it covers multiple stages of the customer journey, and it is a tool that could be fitted or used as a platform for uptake of renovation packages.

5.1 EXAMPLE OF SCREENING TOOLS IN RESPECT TO CUSTOMER JOURNEY

This section presents the process of assessing which stages of the Customer Journey are covered by the respective online tool. The process is visualized for the one of the tools as an example. The selected example tool is “Byggeriogenergi”, which includes both calculation tools and descriptive sections. Through the review, this particular tool covers steps 1 to 5 and 11 in the Customer Journey. Figure 5 and Figure 6 present print screens with some main text translated from Danish to English.

Figure 5 shows the front page of the web-based tool “Buildings and energy”. Translations of the content are provided in red colour in the figure. As presented in section 4.2.2, this tool is very rich in high quality information.

Videncenter for Energibesparelser i Bygninger

Stages in Customer Journey

1-4 Energiøsninger Energy
3-5 Værktøjer Tools
1-5 Innovation og inspiration Innovation and Inspiration
3-4 Lovgivning Laws
1, 2, 11 Aktuelt Up-to date
1 - 5, 11 Brochurer og links Brochures and links
1-5 Film Om Videncentret About

Free guidance on energy savings

Gratis vejledning om energibesparelser

For byggebranchen 72 20 22 55 For private (SparEnergi.dk) 31 15 90 00

Find energy solutions Find energiløsninger

Choose a category

Vælg kategori

Klimaskærm
Varmeinstallation
Ventilation og indeklima
El
Bygningsgennemgang

Building envelope
Heating system
Ventilation and indoor climate
Electricity
Building Regulations

Figure 5 Front page of Danish existing tool and its relation to stages of customer journey. (www.byggerioenergi.dk)

Each section of the webpage has different, yet relevant information about renovation. Figure 5 has a translation of each of the section, while the steps of the customer journey that the section supports are in the red boxes above the section names.

As seen in Figure 5, each section covers different stages in the customer journey by either informative text, documents or calculation tools. Figure 6, Figure 7 and Figure 8 respectively show and further describe the sections “Energy solutions”, “Tools ” and “Brochures and links”. The following summarizes the content of the remaining sections of the website and how they support the customer journey:

- **Innovation and Inspiration:** In this section of the website, the home owner can find five sub-sections (innovations in the building, deduction and subsidies, renovation cases, education and presentations). The information in each section is further subdivided into different categories relevant for each sub-section. The information related to innovation in the building sector, education and presentations allow the homeowner to become interested, familiarize him or herself and consider different options (stages 1-4). The sub-section dedicated to tax deductions and subsidies covers step 5 in the customer journey by giving a good idea of financing options and support grants. It also provides link to the website, which includes all relevant information.
- **Laws:** The law section provides information about regulatory requirements placed to reduce energy requirements of buildings. The information, provided in the five different sub-sections in not extensive, but short and with direct link to detailed information in the relevant websites for organizations or ministries. The information available in this section of the website supports the customer in stages 3 and 4 by providing the homeowner with summary of the regulatory requirements, which also helps in evaluating different options in respect to current laws.
- **Up to date:** This section provides news on different topics in the area of buildings and renovations. The information is sorted by year and makes it possible for the homeowner to become aware of the different options and interested in renovation (stages 1 and 2). This page is also considered to support stage 11 of the customer journey – “Wanting more”, as there is a possibility for subscription for newsletter.

- **Film:** Presently, 22 short descriptive films are available in this section of www.byggeriogenergi.dk with new films being uploaded periodically. Each one is titled and targets specific renovation solutions. The films have a duration of approximately 10 minutes and explain to the viewer the process, steps and importance of the energy solution in question. The variety of the films and the information provided by them covers a wide range of the topics covered in the first five stages in the customer journey.

Figure 6 shows section “Energy solutions” from the www.byggeriogenergi.dk website. The page can be considered as five different sections, outlined with the red dotted lines. Each of those sections correspond to different stages in the customer journey, as indicated in the figure. The first section on the left allows homeowners to become aware of the possible options for renovation and consider them individually. The first section on the top-right presents short topic name and general content of the selected page. The middle section provides a short explanation of all content given on the topic. It can be considered as an “appetizer” for the viewer, which encourages them to look further in the topic. The third section on the right side presents different energy solutions for the given topic, stimulating the viewer to become active by looking into the alternatives. At the bottom of the section, there is a direct link to a relevant video. With the provided information in the video, the homeowner can understand the importance and be motivated to make the renovation.

Hjem > Energiløsninger > Facade, vinduer og døre > Udskiftning: vinduer, ruder, yderdøre

Energiløsninger

Tag og loft

Facade, vinduer og døre

Udskiftning: vinduer, ruder, yderdøre

Efterisolering af let ydervæg

Efterisolering af tung ydervæg

Efterisolering af gulv, kælder og fundament

Utætheder, kuldebroer og isolering

Ventilation

Varmeinstallation

El

Tjeklister til bygningsgennemgang

Etageejendomme og andre store bygninger

Energy solutions for different components

Sådan udskiftes vinduer, ruder og yderdøre

Topic name and general content

Ældre vinduer og døre samt vinduer og døre med tegn på råd eller andre tegn på nedbrydning, bør udskiftes til nye vinduer med energiruder.

Energiløsningerne nedenfor beskriver, hvordan du gør, og hvornår du kan også se en film nedenfor om udskiftning af termoruder.

Short explanation of the whole content within the topic

Energiløsningerne indeholder blandt andet:

- Anbefalinger til energiforbedring af ruder og yderdøre
- Eksempler på besparelse ved energiforbedring af ruder og yderdøre
- Tjeklister til energiforbedring af ruder og yderdøre med udbedringsforslag
- Guider til udførelse af energiforbedring af forskellige ruder og yderdøre

Different energy solutions for the given topic

Energiløsning: Energiforbedring af vinduer med forsatsrammer

Energiløsning: Udskiftning af vinduer med ét lag glas

Energiløsning: Udskiftning af vinduer med termoruder

Energiløsning: Udskiftning af termoruder

Energiløsning: Energiforbedring af vinduer med koblede rammer

Energiløsning: Udskiftning af yderdøre

Short video explaining why renovate and showing the process step-by-step

Udskiftning af termoruder

SparEnergi

Figure 6 Page “Energy Solutions” from the Danish existing tool www.byggeriogenergi.dk

Figure 7 shows the section “Tools” from the website. This section of the website can be split into three main sections, outlined in red dotted lines. The left section provides an overview and link to all available calculation tools on the webpage. The tools are separated in 1. Building regulations, 2. Calculations and guides and 3. Tools for large buildings.

The second section of the page (top left in Figure 7) provides brief information and more visual content, which is relevant for renovations and pleasing to the eye. The third section, at the bottom left corner, provides description of each of the available tools and what they can be used for.

The wide variety of the tools allows that homeowners or their single point of contact (renovation coach) to become active by performing simple calculations and obtaining insight to their house status. Besides that,

the calculation tools provide the opportunity to compare different renovation options as well as provide insight to potential energy and money savings.

Tools ▼ Værktøjer

BR15 BR15

BR15 tool BR15 Værktøj 

BEREGNER OG ONLINE GUIDES

Savings calculator Besparelsesberegner 

Moisture calculator Fugtberegner 

Membrane guide Dampspærreguide

Heat pump guide Varmepumpeguide

Step-by-step on insulation of attics Trin-for-trin håndbog om efterisolering af tagetager 

Tools for large buildings **VÆRKTØJER TIL STORE BYGNINGER**
Tjek boligejendommens energimærke 

Energigranskning - energioptimeret byggeproces

Værktøjer til serviceteknikere

3



3
Becoming active

4



4
Considering the options

5



5
Financing

Beregner, fugtberegner, BR15-værktøj og andre værktøjer til energirenovering

Besparelsesberegner og fugtberegner samt værktøjer til BR15, dampspærre, varmepumper, energigranskning, tagetager, benchmarking og serviceteknikere - find det hele her.

Calculation tools; BR15-tool and other tools for renergy renovation





Her finder du en række nyttige værktøjer til at opnå energirenovering i høj kvalitet:

- BR15 værktøj og informationsmateriale: Hvilke regler gælder der i bygningsreglementet ved energirenovering
- Energibesparelsesberegner: Beregn potentialet for energibesparelser i enfamiliehuse og etageejendomme
- Fugtberegner: Gør det nemt at teste, om den tiltænkte efterisoleringsløsning er fugtteknisk forsvarlig
- Dampspærreguide: Hvordan du bruger dampspærren ved efterisolering
- Varmepumpeguide - en guide til den gode varmepumpeinstallation gennem hele processen fra valg af løsning til dimensionering og aflevering
- Trin-for-trin håndbog til efterisolering af tagetager, der benyttes til beboelse
- Værktøj til at sammenligne forbruget i en konkret etageboligejendom med energiforbruget i alle Danmarks etageboligejendomme
- Værktøjer, du kan benytte til at energigranske og opnå en energioptimeret byggeproces ved renovering
- Værktøjer til serviceteknikere/installatører: Brug dem til at fremme dialogen med bygningsejerne om mulighederne for energibesparelser

Short description of each tool and it's capabilities

Du kan finde værktøjerne i venstre menubar.

Figure 7 Page "Tools" from the Danish existing tool www.byggerioqenergi.dk

Figure 8 shows the content of the "Brochures and Links". The page is split in three sections (Links, "The small blue guidebooks" and Instructions from the Danish Building Research Institute). The section containing links covers a wide variety of building industry related webpages. Those pages being from the current building regulations, sustainability forums and topics, energy renovations, quality control, available educations to government institutions.

The "Small blue guide books" are collection of pocket size publications about ventilation, system optimization, heating and heat pumps. The guidebooks provide thorough information regarding the topic. Those books are better suited for technical personal, rather than homeowners. Despite the fact that they could still provide inspiration to homeowners. Furthermore, renovation coach can use those for evaluating and considering different options.

The instructions formed by the "Danish Building Research Institute" (SBI) are technical documents, typically focused on one solution at a time (insulation, ventilation, calculation of daylight in buildings, etc.). Similarly, to the small blue books those documents are targeted at professionals, rather than homeowners.



Brochurer og links **Brochures & links**

Videncentrets forskellige generelle informationsbrochurer finder du nedenfor.

Ud over nedenstående udgivelser kan du under menupunktet "energiløsninger" finde alle energiløsninger og guides og forskellige værktøjer og materialer under menupunktet "værktøjer". Desuden er der cases og andre inspirationsmaterialer under "inspiration".

Links

"The small blue books" by Danish Energy
SBI - Instructions

1  2 
Becoming aware Becoming interested

3  4 
Becoming active Considering the options

Annual report of the "Knowledge center" for 2016
Videncentrets årsrapport 2016

Aktiviteterne i 2016 var præget af aktiviteter i forbindelse med det nye bygningsreglement, BR15. Desuden lancerede Videncentret i 2016 bl.a. en lang række nye energiløsninger, en fugtberegner, undervisningsmateriale om energirigtig drift samt nye vejledninger om performancetest, der kan hjælpe med at løse problemet med dårligt fungerende bygningsinstallationer.

[Hent rapporten \(pdf\)](#)

Need for professional talk on energy efficiency?
Brug for et fagligt indlæg om energieffektivitet?

Er du ved at arrangere et seminar, et gå-hjem-møde eller en uddannelsesdag for fagfolk om energirenovering? Så har du mulighed for at bestille en indlægsholder fra Videncentret for energibesparelser i bygninger. Vi tilbyder faglige indlæg om emner relateret til energieffektivitet i bygninger inden for en række områder.

[Læs om indlæg her \(pdf\)](#)

Short and good about the "Knowledge center"
Kort og godt om Videncentret!

Læs om Videncentret for energibesparelser i bygninger og vores mange forskellige tilbud til byggebranchen.

Figure 8 Page "Brochures and Links" from the Danish existing tool www.byggerioqenergi.dk

5.2 SUMMARY

The conclusions drawn based on the analysed tools do not take into account all available tools. Only tools selected for the review are considered. Therefore, conclusions might not be complete and are limited to the sample on which they are based. Still, the size of the sample is quite large and, therefore, conclusions are considered as indicative.

A summary presented in Table 2 shows that the initial stages 1 – *Becoming aware* to 4 – *Considering the offer* are the stages that are supported by the largest number of tools. Stage 5 – *Financing* is supported by nine tools, stage 6 by seven tools and stage 7 by three tools. One of the screened tools is set to cover the whole customer journey, although this is a renovation company, which offers renovation services, rather than online tool supporting the customer. Nevertheless, it is worth mentioning as this tool provides a rather holistic approach towards a renovation process.

The analysis shows that the tools do not cover the second half of the customer journey, steps 8 to 11. While one might think that this is the less important area within the journey, this part of the Customer Journey is in fact of critical significance to reach a deep energy renovation among house owners. As concluded throughout the project, many of house owners would decide to execute energy renovation in steps. Therefore, the key factor to keep them in the loop is to make them aware of obtained goals. Also to make them aware that they can have influence on the energy performance (step 8 *Experience*), that they are provided with the necessary professional feedback and support (step 9 *Organising*) and that they can

share their experience (step *10 Sharing*) with other house owners. The last step, step *11 Wanting more*, is to keep the house owner informed about upcoming renovation possibilities, grants, events and similar.

A tool allowing online monitoring of the house and comparing energy performance to other houses or benchmark could address Step 8.

Step 9 does not require a tool as such but rather contact possibility, through phone, e-mail or chat.

Step 10 could be provided by dedicated social platform, on-line forums or similar.

Step 11 could be provided through e-mail, social platform alerts and periodic brochures

Table 1 Summary of tools supporting energy renovation and their distribution within the customer journey.

Tool name \ Step	1	2	3	4	5	6	7	8	9	10	11	Link
Sparenergi	X	X	X	X	X	X						www.sparenergi.dk
Byggeriogenergi	X	X	X	X								www.byggeriogenergi.dk
Boligejer.dk			X	X			X					www.boligejer.dk
Bespareslesberegner	X	X	X	X	X							www.sparenergi.be10.sbi.dk
Husetsweb	X	X	X	X	X							www.modstroem.husetsweb.dk
Husestsenergi beregner	X	X	X	X	X							www.beregner.husetsenergi.dk
Ren2BEN			X	X								www.warmerwonen.be/renben
Ecobouwers.be	X	X	X	X	X	X						www.ecobouwers.be
Premiezoeker					X							www.premiezoeker.be
Renovatiestarter				X								www.renovatiestarter.be
Vind uw aannemer						X						www.vinduwanaannemer.be
Build your home						X						www.buildyourhome.be
Samen Sterker						X	X					www.samensterker.be
Energie ID								X				www.energieid.be
Bouwinfo										X	X	www.bouwinfo.be
Livios - bouwen aan morgen				X								www.livios.be
Check je huis	X	X	X	X								www.klimaat.stad.gent/check-je-huis
Zonnekaart	X	X	X	X								www.energiesparen.be/zonnekaart
Energiewinstcalculator				X								
BINE			X	X	X							www.energiefoerderung.info
energie-experten.org	X	X	X									www.energie-experten.org
Energiesparen im Haushalt (energy saving in private households)	X	X	X									www.energiesparen-im-haushalt.de/energie/bauen-und-modernisieren/modernisierung-altbausanierung.html
RENEWA		X	X	X	X	X	X	X	X	X	X	www.renewa.de
Zukunft Altbau	X	X	X									www.zukunftaltbau.de
Zukunft-Haus; Energieeffizienz-Expertenliste	X	X	X									www.zukunft-haus.info/startseite.html www.zukunft-haus.info/tools/energieeffizienz-expertenliste.html
effizienhaus-online	X	X	X	X								www.application.effizienhaus-online.de/sanierungsrechner/#?state=0
Sanierungskonfigurator	X	X	X	X								www.sanierungskonfigurator.de/start.php

6 Development of a tool for market uptake of renovation packages

6.1 FUNCTIONAL DESIGN

6.1.1 Concept and main features

REFURB developed an online tool and approach to ensure market uptake of renovation packages. 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.

The tool targets homeowners; hence the main challenge for this tool is to provide accurate information on technical topics such as energy efficiency and NZEB renovation but, at the same time, using an understandable language. Tools and services developed for use in the building process often use the language of the building professionals (e.g. thickness of insulation, or R-values, U-values, etc.). However, in order to appeal to a broad range of customers, who do not necessarily feel confident with technical terms, this means that a less technical language might be recommendable instead.

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

The following sections discuss concept and key features of the tool

6.1.1.1 Links with the customer journey to renovation

My Energy Compass is part of an entire toolbox of services and tools within the framework of a regional renovation program of Leiedal. Other tools and services in toolbox are a "renovation coach" service, as well as a pool of contractors, pilot renovations, communication (a dedicated website, brochures, renovation caravan, witnesses and so on), stakeholder cooperation and financial incentives.

My Energy Compass specifically addresses the first stages of the customer journey:

- Create awareness (stage 1)
- Getting homeowners interested (stage 2)
- Get homeowners active (stage 3)

However, it is not limited to these stages as it also "nudges" homeowners to other stages in the journey, more in particular:

- Let them consider the different options (stage 4), which can be further complemented by the Renovation Coach service

- Help homeowners to find financial solutions (stage 5) and building contractors (stage 6)

In every stage of the customer journey, there is a risk that homeowners drop out. Homeowners might be put off with the result that they decide not to continue with their intentions to renovate. *My Energy Compass* contains a number of measures or strategies to address these barriers and thus limit this risk. The most important barriers on which *My Energy Compass* focuses are discussed below. Many of the insights described below are based on the REFURB reports on the “mapping the demand side” (WP2) and “mapping the supply side” (WP3). Most barriers are linked with the way to present or structure information, as there is plenty of information on NZEB renovations available, but homeowners have difficulties to find the right information for their situation.

6.1.1.2 Insight on the energy performance of the dwelling

Homeowners need to have insight in the energy performance of their dwelling. An Energy Performance Certificate (EPC) is one of those instruments to map the energy performance of the dwelling. But from a homeowner’s perspective, an EPC is a cost and might be difficult to interpret. Furthermore, an EPC in Flanders is only obligatory when selling or renting out a dwelling. In addition, advice from a building professional on the energy performance typically comes later in the process, as these professionals mostly only get involved in the stage when the executions of measurements are prepared.

The energy bill could provide another indication of the energy performance. But it is difficult to distinguish the impact of the energy consumption behaviour (e.g. time of use, number of inhabitants), the comfort level (e.g. only heating up parts of the dwelling) and the energy prices.

Furthermore, at early stages of the customer journey, homeowners do not necessarily need a very detailed assessment of the energy performance of their house (this can be done later in the renovation process, when planning actual renovation measures). A first impression of the energy performance could suffice.

- ⇒ *My Energy Compass* offers a free estimation of the energy performance of the dwelling:
 - A rough estimation for all dwelling of the region.
 - An improved estimation, based on the questionnaire of the online tool.

These estimations are calculated based on statistical analyses of the EPC database for the region (see below).



Figure: *MijnEnergiekompas.be* offers an estimation of the energy performance of all dwellings in the region

6.1.1.3 Tailor-made information

Homeowners are confronted with too generic information and miss the tailor-made information. Every dwelling is different, every situation of a homeowner is different and every homeowner gets convinced by

other argumentations. Generic information can repeat what the homeowner already knows or propose solutions that are not applicable or preferable. This can increase the confusion of homeowners on “what to do”, discouraging him or her or worse, let them change their mind even if they were originally planning to conduct an energy renovation. For instance, a homeowner with intention to install a photovoltaic cell system because of the environmental added value could be discouraged if he is only confronted with information on the poor financial return on investment.

- ⇒ *My Energy Compass* not only provides a tailor-made estimate of the energy performance of the dwelling (and a tailor-made improved estimation), based on the answers provided by user, it also generates a personal renovation report. In this renovation report, the homeowner can find the necessary NZEB solutions suited for his/her dwelling and vision on renovation. The renovation report also contains the next steps for his/her renovation process and a tailor-made offer of the municipality (depending on the subsidies available in the municipality).

6.1.1.4 *Insight on necessary NZEB-measurements*

NZEB is a relatively new term. Homeowners also are confronted with affiliated terms like “passive house”, “energy neutral”, “energy positive”, “climate neutral”, etc. This might be overwhelming and confusing.

Secondly, the consequences of applying of the national NZEB standards to the dwelling are unclear. Which measurements are necessary to achieve this level? What is the most feasible combination of technical measurements? What is recommended?

- ⇒ *My Energy Compass* generates a personal renovation report. This renovation report explains that NZEB is the new standard and will make the dwelling future-proof. For each building element (roof, walls, floors, ventilation, windows, heating installation, renewables), the report indicates the necessary NZEB solutions. This advice is based on the answers given in the questionnaire, but also on the feasibility. For instance, if the roof already is well insulated (but not perfect), then the report indicates that better insulation is needed on a long term to achieve NZEB, but that other measurements can be prioritized. However, if roof work is planned, then at least 18 cm of insulation is recommended.
- ⇒ The online tool (and the report) also contains an infographic with a “top 3” of most recommended measurements. These three measurements are selected based on an algorithm that weighs the energy gains of each measurement (impact) with the ease of execution of each measurement (e.g. isolating a cavity wall is much easier than a floor without cellar) and the avoidance of lock-ins (e.g. first roof insulation, then PV).

6.1.1.5 *Reliable information*

Home owners seek reliable information. Homeowners can distrust the source of information, e.g. a supplier

Figure 9 My Energy Compass shows the top-3 measurements



of building material can be perceived as prejudiced or non-objective as they will tend to recommend their own products or services. Public bodies can be seen as inherently objective, but not as the best technical expert.

- ⇒ *My Energy Compass* is developed and marketed by Leiedal, an association of local authorities. The provided information is independent of interests of the building sector and in line with the latest policies. Leiedal can build on technical and non-technical expertise by knowledge partners (e.g. universities) and local and international partners (e.g. through the REFURB project, or a regional stakeholder network) to underpin the knowledge.
- ⇒ There is a strong link with the municipalities: the municipalities support not only the communication about the tool, but also the tailor-made renovation reports (.pdf) contain references to the services of the municipalities.

6.1.1.6 Non-technical language & available knowledge

Communicating a very technical topic such as NZEB renovation in a non-technical language is a challenge. In order to reach as many homeowners as possible, *My Energy Compass* addresses this challenge in a number of ways.

- ⇒ For the estimated EPC level, *My Energy Compass* makes use of an energy label, based on the European energy labels (for instance used for household appliances, with a scale in seven levels: A, B, C, D, E, F, G) instead of the Flemish conventions for EPC (with a slider and a value between 0 and 700 kWh/m²/annum). The energy label class is very recognizable nowadays. It is also very intuitive: A is very good, G is very bad. “A” is assigned to the NZEB level.

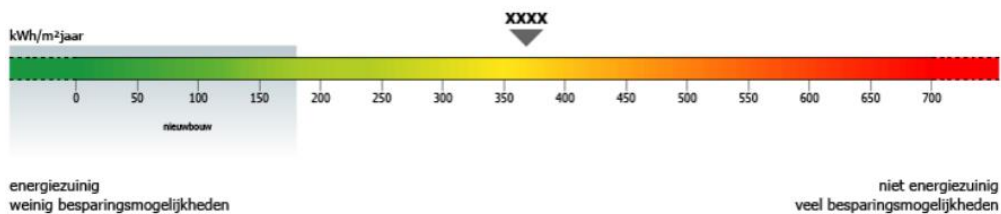


Figure: official visualisation of the EPC in Flanders. A value is situated above a slider.

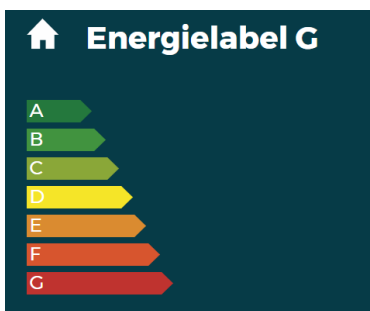


Figure: visualisation of the energy performance in My Energy Compass

- ⇒ The questionnaire avoids technical issues in the questions and possible answers. Most homeowners do not know the number of centimetres of insulation in their roof or wall, even less the insulation material, not to mention the R-value or U-value. It is more important how they feel and perceive the insulation: is it poorly, well or perfectly insulated? This is directly linked with their intention to renovate. For instance, if they answer “perfectly insulated”, they will have little intention to renovate even if an expert says otherwise. If the user wants more information (e.g. if the question is unclear or if his/her dwelling is specific, a more technical explanation is hidden under a (+) –sign next to the question.

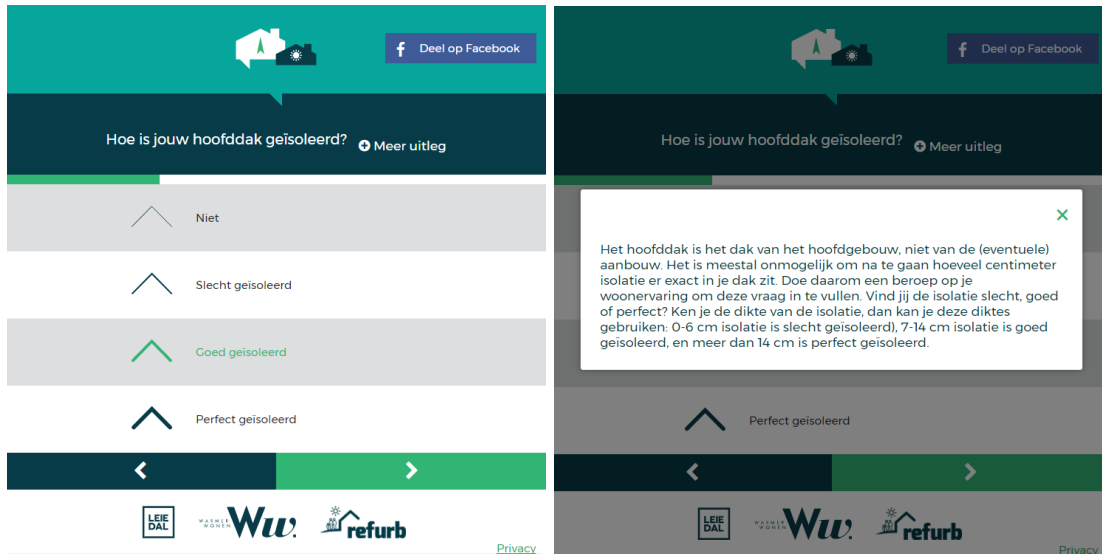


Figure: “Is your main roof insulated?” “No”; “Poorly insulated”; “Well insulated”; “Perfectly insulated”. Under the button “meer uitleg” (“more explanation”), the user can find indicative thicknesses for each possible answer, and more explanation on the definition of “main roof”.

- ⇒ The survey does not require input data that is difficult to obtain for the homeowner. For example, most homeowners do not know their yearly energy consumption, but they are more familiar with their monthly energy costs. The tool also allows to choose the option “I don’t know the energy cost, use the average for this type of dwelling”.



Maandelijks
 Jaarlijks

Elektriciteit

kost in Euro

Gas

kost in Euro

< >







[Privacy](#)

Figure: under the question “What is your energy consumption?” the user can choose a default energy use, or fill in the monthly or yearly energy cost. Based on this, the tool estimates the consumption based on average energy prices.

- ⇒ The questions make use of short text descriptions and easy-to-understand icons. This not only avoids drop outs (users might have difficulties with large blocks of text), it also is optimised for use on smartphones and tablets.



Figure: A selection out of the set of icons was developed for My Energy Compass.

- ⇒ A visually attractive infographic summarises the results in the renovation report and the end-screen of My Energy Compass.

6.1.1.7 Renovation as a process

My Energy Compass includes mechanics to “nudge” homeowners to continue the customer journey, by directing them to other steps or services of the journey.

In the tailor-made renovation report (a .pdf file generated automatically), there are many linkages and suggestions as to how to proceed, based on the answers that the user has given in the tool. Here, the tool can take advantage from the fact that it has been developed within a wider regional renovation program.

For instance, if homeowners indicate that they need more info on financial solutions, the renovation report will provide financial information. If the homeowner is looking for good building contractors, then they are redirected to the pool of selected NZEB contractors, etc.

However, the key to have the homeowners continue and finally complete the customer journey is the support offered by the renovation coach service. The renovation report of My Energy Compass suggests homeowners to contact the Renovation Coach for additional advice during a free intake meeting. Whereas My Energy Compass is very suited for the first steps of the customer journey (awareness creation, getting homeowners interested in NZEB renovations and letting them consider their renovation options etc.), the

Renovation Coach is an important instrument to give homeowners the confidence to continue with a renovation and to unburden them through their renovation process.

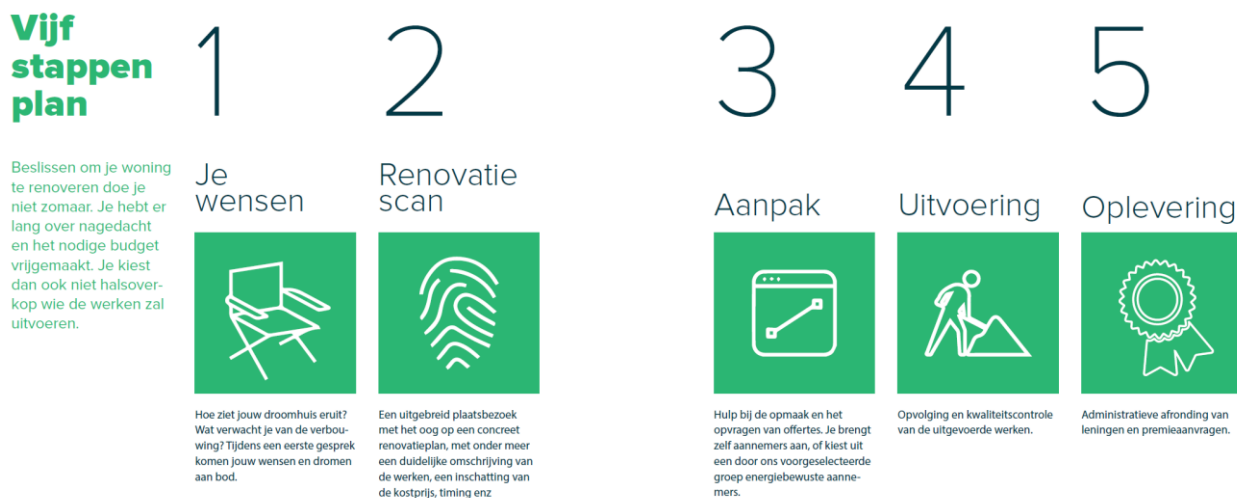


Figure: the support offered by the renovation coach: 1) Free intake 2) On-site visit 3) Support to select contractors 4) Support during construction 5) Administrative support after commissioning

6.1.1.8 Respond to the drivers

My Energy Compass includes a number of "nudging" techniques to stimulate user behaviour. A key technique applied in this sense is benchmarking. Homeowners are compared to each other; a user can position him or herself compared to others. This is illustrated in a number of ways:

- The Map of region, showing the indicative EPC label of all dwellings, allows comparison with the neighbourhood or municipality.
- The key infographic indicates how the dwelling performs in comparison to other (e.g. "your dwelling belongs to the 9% best energy performant of the region")
- The key infographic indicates whether the energy consumption is low – average – or high in comparison to similar dwellings
- The A label corresponds with the NZEB level for renovated houses. This serves as a point of reference: "if you want to have the best, then you need to reach NZEB". Thus, homeowners can compare their dwelling with the NZEB standard.

Another key technique is the attention to the non-technical advantages of NZEB. Comfort improvements are emphasised instead of the energy and cost savings; for instance, warm feet during wintertime because of a perfectly insulated floor, making the dwelling future-proof by applying NZEB standards, etc.

6.1.2 Step-by-step description

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

All issues will be resolved by running through the tool, notwithstanding the option is chosen from the first screen (runs through different trajectories).

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.

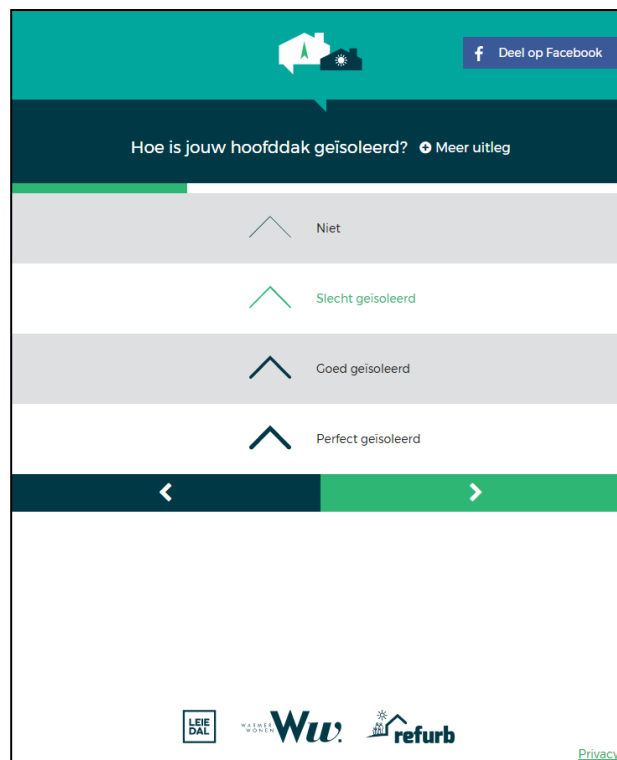
The tool is presented step-by-step in the following section:



When choosing the first option, a map shows rough estimates of energy labels, based on a statistical analysis of the EPC database. Homeowners can find their dwelling on the map.



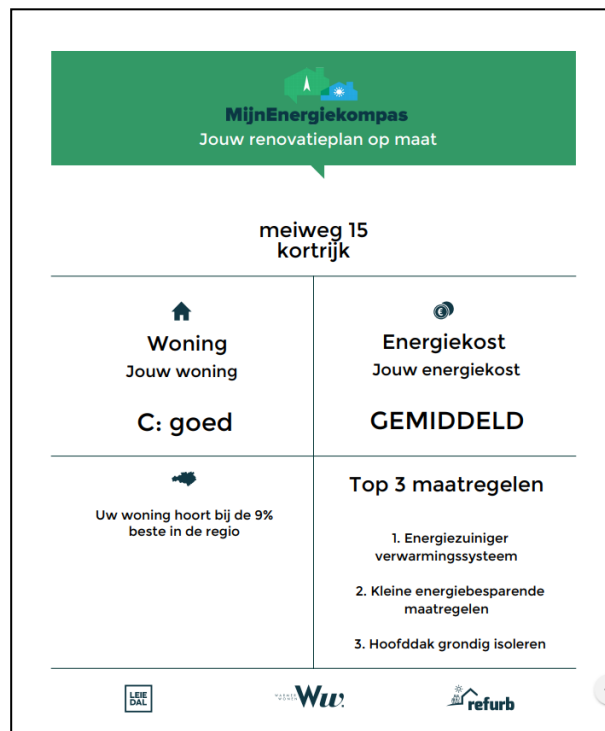
Then, homeowners have the option to improve the estimate of the energy label of their house. They have to run through a questionnaire. The text is short, and icons are used to make it intuitive.



After running through the questionnaire, there is an infographic with the results. A back-office module, based on an in-depth analysis of the EPC database, calculates an improved estimate of the energy label. The energy cost of the homeowner is benchmarked.



Homeowners can download a tailor-made renovation report. In the tailor-made renovation report, homeowners get another infographic with a resume (e.g. the top 3 of renovation measurements needed).



On the second page, they get an advice on how to make their dwelling future-proof (NZEB). Per building element (wall, floor, roof, installations etc.), they get an advice on the possible improvement, the priority it has and the non-energetic advantages it brings (e.g. extra comfort, new look of the house etc.).



MijnEnergiekompas
Maak je woning toekomstbestendig
Start nu

Je vindt dat jouw woning dringend aan verbouwingen toe is, dat een grondige verbouwing zich opdringt. De energieprestatie van jouw woning is gemiddeld, er is dus nog marge voor verbetering. Met welke ingrepen maak je een warme, gezonde en comfortabele woning? Hoe zorg je dat ze haar waarde behoudt en je energiefactuur onder controle blijft?

Hier vind je maatregelen om jouw woning "BEN" te maken (Bijna-Energie neutrale Woning). BEN is de norm van de toekomst, voor nieuwe woningen en bij renovaties. Ga mee met de tijd.

	Je hoofddak bij-isoleren is de hoofdprioriteit. Dit slecht geïsoleerde dak laat zeer veel koude binnen, vooral als je de ruimte eronder gebruikt. Een perfect geïsoleerd dak geeft je veel meer wooncomfort. Reken op minstens 12 à 20 cm isolatie. Je bijdak bij-isoleren is geen prioriteit, tenzij je van plan bent het bijdak te vernieuwen.
	Je weet niet of je volle muren of spouwmuren hebt, maar wel dat ze niet geïsoleerd zijn. Laat nagaan of je een spouwmuur hebt. Een spouwmuur kan eenvoudig geïsoleerd worden, maar het isolatieniveau is beperkt. Bij een grondige verbouwing ga je voor minstens 10 à 16 cm isolatie, waarop een nieuwe gevelafwerking komt.
	Een perfect geïsoleerde vloer zorgt voor warme voeten. Je hebt een kelder, dus het is mogelijk om via het kelderplafond de vloer van jouw woning (of een gedeelte ervan) eenvoudig bij te isoleren tot minstens 7 à 11 cm isolatie. Zo moet je de vloer niet uitbreken voor een nog comfortabeler en warmer gevoel.
	Je beschikt al over superisolerende beglazing. Deze laat 3 keer minder koude binnen dan dubbele beglazing, en 10 keer minder dan enkel glas. Dit zorgt voor een warm gevoel omdat de ramen veel minder koude uitstralen en winddicht zijn. Zorg dat je ventilatiesysteem goed werkt om vocht- en gezondheidsproblemen te vermijden.
	Hout of pellets zijn een duurzame vorm van verwarming. Maar zorg vooral dat de woning voldoende geïsoleerd is. Zo vermijd je energieverbruik, en dat is het belangrijkste voor de energieprestatie van jouw woning.

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On the last page, they get an advice on how to proceed. Where to find the information on financial solutions, where to find someone to help with the renovation (RenovationCoach), how to improve comfort, etc.



MijnEnergiekompas
Maak je woning toekomstbestendig
Zo pak je het aan

Meer comfort

Jouw energieverbruik is lager dan gemiddeld. Een renovatie van je woning zal jou vooral een groter comfort opleveren zoals een aangenaam en gezond binnenklimaat in elke ruimte.

Eerste hulp bij renovatie van je huis

Omdat elk huis anders is, komt de RenovatieCoach ook bij je thuis kijken. Zo zoek je samen met een expert naar een duurzame oplossing op maat. [Lees alvast in deze brochure](#) hoe de RenovatieCoach te werk gaat en wat hij voor jou kan doen.

Besparen hoeft niet altijd veel geld te kosten

Wel soms een verandering van gewoontes, een beetje van uw tijd of een kleine moeite. Wat kan je doen aan je verwarming? En in de keuken? En met elektrische toestellen? Lees de eenvoudige besparingstips op <http://www.energiesparen.be/tips>

Ik heb nog concrete vragen

[Neem contact op](mailto:renovatiecoach@warmerwonen.be) met de RenovatieCoach. Hij geeft je gratis via renovatiecoach@warmerwonen.be of [056 24 16 19](tel:056241619) snel een antwoord, vanuit zijn ruime netwerk vol ervaring.

Hoe verdergaan	☎ 056 24 16 19	renovatiecoach @warmerwonen.be
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649865

6.2 TECHNICAL SPECIFICATIONS

Tool is only valid for single-family dwellings, not for apartments or other types of dwellings.

6.2.1 Questionnaire

The questionnaire consists of 21 questions. The first block of questions focuses on the dwelling. Consequently, there are questions focussing on the household situation. Finally, there is a set of questions on the renovation profile and renovation preferences.

Questions on the dwelling – basic information

1. In which type of dwelling do you live?
 - Detached
 - Semi-detached
 - Terraced
2. What is the year of construction of your dwelling?
 - Pre 1920
 - 1921-1945
 - 1946-1970
 - 1971-1985
 - 1986-1995
 - 1996-2005
 - 2005
3. What is the habitable floor area?
 - Small, lower than 100 m²
 - Mid-size, between 100 and 200 m²
 - Large, more than 200 m²
4. Which type of roof is the main type?

- Flat roof
 - Pitched roof
5. Is there a basement under large parts of the dwelling?
- Yes
 - No

Questions on the dwelling - insulation

6. Is your main roof insulated?
- No
 - Poorly insulated
 - Well insulated
 - Perfectly insulated
7. How is your secondary roof insulated?
- I don't have a secondary roof
 - No
 - Poorly insulated
 - Well insulated
 - Perfectly insulated
8. Which type of glazing has your dwelling?
- Single glazing
 - Double glazing
 - High-performance glazing
9. Does your dwelling have cavity walls?
- Yes
 - No
 - I don't know
10. Is your façade insulated?
- No
 - Well insulated
 - Perfectly insulated
11. Is your floor insulated?
- No
 - Well insulated
 - Perfectly insulated

Questions on the dwelling – ventilation and installations

12. How do you ventilate your dwelling?
- No particular ventilation system
 - Natural ventilation via ventilation gratings
 - Mechanical ventilation
 - Ventilation with heat recovery
13. How do you mainly heat you dwelling?
- Electricity
 - Individual gas or oil stoves
 - Wood or pellets
 - Central heating system with an old boiler
 - Central heating system with a high performance boiler
 - Central heating system with a heat pump
14. Do you use renewables?
- Solar heat for tap water
 - Solar panels (photovoltaics)
 - Heat pump
 - No

Questions about the homeowner – household profile & use of dwelling

15. I am a
 - Homeowner
 - Tenant
 - Landlord
16. How many people live in your dwelling?
 - *[open to complete a number]*
17. Do you heat your dwelling during the day?
 - Yes, multiple days per week
 - Yes, only during the weekend
 - No
18. What is your energy consumption?
 - I don't know the energy cost, use the average for this type of dwelling
 - I know the cost, and I use electricity and gas
 - i. Monthly
 - ii. Yearly
 - iii. Electricity: cost in Euro: *[open to complete a number]*
 - iv. Gas: cost in Euro: *[open to complete a number]*
 - I know the cost and use electricity and fuel oil
 - i. Monthly
 - ii. Yearly
 - iii. Electricity: cost in Euro: *[open to complete a number]*
 - iv. Fuel oil: cost in Euro: *[open to complete a number]*

Questions about the homeowner – renovation profile & needs

19. What is the state of your dwelling?
 - Perfect as it is. But I'm always open for small improvements.
 - The dwelling is quite OK. But we plan some improvements, step by step.
 - We urgently need a full renovation. The dwelling is outdated, uncomfortable, too small, a too high energy bill...
20. What type of renovator are you? *(it is possible to check multiple options)*
 - I work together with professionals
 - I'm a do-it-yourself-er
 - I need coaching in the renovation process
 - I do not feel like renovating, or I lack time and/or money.
 - I prefer moving to a better dwelling
21. This is what I need and brings real added value *(it is possible to check multiple options)*
 - Advice on energy-issues
 - Security that the renovation is future-proof
 - Real examples of energy renovations
 - Reliable building contractors and architects
 - Advice with finding subsidies and energy loans
 - Advice with comparing offers and quality control with right execution of works
 - Support with administration and demands for subsidies

6.2.2 Energy performance

The tools to estimate the energy performance of the dwelling are based on an estimation of the numerical value of the EPC. This is segmented in seven categories. For the Flemish context, following limits are used: A = 0-99 kWh/m², B = 100-199, C = 200-299, D = 300-399, E = 400-499, F = 500-599 and G = >600.

A NZEB dwelling (renovation) has an estimated energy performance of 100-110 kWh/m² annum in the Flemish context.¹ This corresponds with the best label, "A". Based on the analysis of the EPC database of Flanders, we observe that only 1% of the dwellings reaches the "A" level (see table below).

A	1% of the dwellings in Flanders
B	19%
C	21%
D	16%
E	14%
F	11%
G	18%

Figure: Distribution of energy performance in Flanders, based on the EPC database

This way, a future-oriented and normative classification is made, clearly showing the level of ambition. Only NZEB qualifies for the A label.

6.2.3 Rough estimation of energy performance based on EPC database

The tool creates a rough estimation for all dwellings of the region. Real EPC values are not published, for privacy reasons.

An estimation is made by combining two datasets:

- the EPC database
- the land register (cadastre)

6.2.3.1 Analysis of the EPC database

Scientific research on the EPC database of Flanders (Belgium) shows that there are three important (non-energetic) characteristics correlating with the energy performance of a dwelling². These are as follows:

- Type of dwelling (detached, semi-detached, terraced). A terraced house has two facades, a semi-detached house has three and a detached house has four. This clearly has an impact on the compactness and as a consequence on the EPC.³
- Floor surface. This is an alternative indicator for the originally preferred indicator, the "total heat loss surface" of a dwelling, which has a high correlation with the EPC value. The bigger the size of a dwelling, the bigger the "total heat loss surface" (surface of floors + walls + roof).
- Building era. In particular from the 1950s, the average EPC decreases for younger dwellings.

Besides these three parameters, other parameters influence the EPC value. Based on the analysis of the EPC database, these are "type of location", "type of owner" (e.g. social housing performs better, private tenancy worst), "volume of dwelling" and "thermal inertia" (e.g. brick vs. wood construction). These characteristics, again, correlate with the three selected ones (e.g. volume of dwelling with floor surface").

¹

http://www2.vlaanderen.be/economie/energiesparen/beleid/Samenvatting_feedback_consensusvoorstel_langetermi_jndoelstelling.pdf

² http://www2.vlaanderen.be/economie/energiesparen/epc/doc/Analyse_EPCdatabank.pdf

³ http://www2.vlaanderen.be/economie/energiesparen/epc/doc/Analyse_EPCdatabank.pdf

6.2.3.2 Data from the land register

To estimate the energy label for all dwellings in the region, the land register is used to extract all needed data for every dwelling.

The land register contains a set of data on every dwelling, e.g. on the ownership, size of the land and building, building age, etc. The three necessary parameters can be deducted.

Type of dwelling

The land register has six categories. The first three are relevant. The other three are out of the scope.

- terraced
- semi-detached
- detached, farms and castles
- ~~— buildings and flats with apartments~~
- ~~— trade buildings~~
- ~~— Other buildings~~

Floor surface

Three categories are defined (based on the categories used in the analysis of the EPC database) as such:

- Small (0-99 m²)
- Medium (100-199 m²)
- Large (+200 m²)

Based a combination of two parameters of the land register, "built floor surface" and "number of floors", all houses are assigned to one of the three categories. A set of rules was created to be able to do so. For example, a dwelling with two floors and a floor surface of 80 m² is categorized as "medium".

Building era

The land register holds all construction dates. As a consequence, all houses can be categorized in the same categories as used in the analysis of the EPC database:

- >=1920
- 1921-1945
- 1946-1970
- 1971-1985
- 1986-1995
- 1996-2005
- 2006-2015

Building era

All construction dates are known in the land register. As a consequence, all houses can be categorized in the same categories as used in the analysis of the EPC-database:

- >=1920
- 1921-1945
- 1946-1970
- 1971-1985
- 1986-1995

- 1996-2005
- 2006-2015

6.2.3.3 *Combination of the parameters*

Combining each category of each parameter leads to a set of combinations: $3 \times 3 \times 7 = 63$ in total.

For each category, the average EPC value was determined based on the EPC database. Then, a label (A, B, C...) was linked with the score (see extract in table below).

The reduction of the 63 combinations into seven EPC labels not only reduces concerns on privacy issues (multiple combinations of the three parameters can lead to a certain energy label, e.g. "C"), it also avoids the perception that the calculation would be precise. It still is a very rough estimation.

Table 2 extract of the labelling of the 63 combinations.

Housing type	Era of construction	Floor area	Average EPC-value (kWh/m ²)	EPC label
Semi detached	>=1920	Small	792	G
		Medium	616	G
		large	508	F
	1921-1945	Small	793	G
		Medium	612	G
		large	492	E
	1946-1970	Small	647	G
		Medium	574	F
		large	460	E
	1971-1985	Small	562	F
		Medium	424	E
		large	351	D
	1986-1995	Small	400	D
		Medium	326	D
		large	288	C
	1996-2005	Small	204	C
		Medium	243	C
		large	228	C
2006-2013	Small	157	B	
	Medium	183	B	
	large	181	B	

6.2.3.4 Assignment of a rough label to all dwellings in the region

Finally, a GIS (geographical Information System) analysis was carried out in order to assign a rough estimate of energy label to all dwellings in the region. The GIS analysis uses a 'layer' with data of the land register was used, and a new layer was created showing all labels with a colour code (from green = A, to red = G).



Figure: GIS-layer with visualisation of the rough energy labels.

6.2.4 Improved estimate of energy performance based on EPC database

The energy label on the map might not correspond with the actual dwelling. Not every roof of houses constructed in the 1960s has the same insulation level; some might already be renovated. Therefore, the user of the tool can further improve the estimation of the EPC-label of his/her dwelling. To estimate the impact of these measurements on the value of the EPC-label, a more advanced calculation methodology is developed.

First, the user needs to complete a questionnaire. Based on the answers of the first fourteen first questions, the result is improved by performing this advanced calculation.

This advanced calculation builds further on the initial calculation, used to estimate the energy label.

The first three questions target the same parameters as in the rough estimation. The data of the land register is verified with the homeowner, and the dwelling is ranked in one of the sixty three categories. This category then corresponds with an average EPC-value (in kWh/m²annum).

The other eleven questions allow to indicate whether the dwelling performs better or worse than the average for that category. If the dwelling performs better, than the average EPC-value is reduced. If the dwelling performs worse, then a penalty is added to the average EPC-value. This is done for every measurement (roof insulation, wall insulation, installations...).

In order to achieve this, for each of the sixty three categories an average U-value of wall insulation, floor insulation, roof insulation and thermal performance of windows, installations... is calculated (based on the analysis of the EPC-database). This U-value is corrected based on the answers given by the end-user, and the impact on the EPC-value is calculated as well (expressed in a positive or negative number). Thus if four answers are possible (not insulated, poorly insulated, good insulated, perfect insulated), then four

corrections are possible. The impact of a certain answer on the EPC will differ for each of the sixty three categories, as the starting position is different.

Table 3 Extract of the calculation table for one question, for 20 of the 63 dwelling categories. For each of the dwelling category, a certain answer can lead to an addition or subtraction or the start value of the EPC. The table shows that the impact of the answer "perfect glazing" on newer dwellings (e.g. dwelling type 20) is less positive than on older buildings (e.g. dwelling type 1). This is because it is expected that the glazing is performant. Contrary, if the homeowners answer that the glazing is poor, then the EPC value will get worse.

	Start value EPC	Question on glazing		
		Single glazing	Double glazing	High performance glazing
Dwelling type 1	639	41	-8	-36
Dwelling type 2	782	50	-9	-44
Dwelling type 3	688	44	-8	-39
Dwelling type 4	713	46	-8	-40
Dwelling type 5	619	40	-7	-35
Dwelling type 6	756	49	-9	-42
Dwelling type 7	666	43	-8	-37
Dwelling type 8	690	45	-8	-39
Dwelling type 9	565	35	-8	-33
Dwelling type 10	691	43	-10	-40
Dwelling type 11	608	38	-9	-36
Dwelling type 12	630	39	-9	-37
Dwelling type 13	408	28	-3	-21
Dwelling type 14	499	34	-4	-26
Dwelling type 15	439	30	-3	-23
Dwelling type 16	455	31	-3	-24
Dwelling type 17	312	28	4	-10
Dwelling type 18	381	34	5	-12
Dwelling type 19	336	30	4	-11
Dwelling type 20	348	31	4	-11
...

With all the answers of the questions, an improved estimate of the EPC value is made. Then, a label (A, B, C, D etc.) is assigned, based on the categorization above.

This method leads to a very broad range of possible combinations (6.5 million in total). This yields a tailor-made estimation of the EPC. However, it is still based on assumptions. Therefore, the decision is made to indicate the energy performance using an energy label, rather than a numerical value. This way, misinterpretation is avoided in the sense that a numerical value would suggest that an accurate result.

6.2.5 Tailor-made NZEB advice

The tailor-made renovation report shows an NZEB advice based on the answers given by the user. A simplified algorithm is used to generate this report. For instance, if the user answers “the floor is not insulated” and “there is a basement”, then the advice will suggest insulating the basement ceiling.

The basis for the NZEB advice is the expertise that the REFURB partners Leiedal and Bostoën build up in the RenBEN project, which developed a tool to define the optimum NZEB measurements (“scorecard”)⁴.

Table 4 Examples of the NZEB renovation measurements. 80 possible answers were developed, but only five answers are shown at a time to each user.

<p>A non-insulated floor will give you cold feet. But, you have a basement. This might make it possible to insulate your floor via basement floor (or a part of the floor) with 15 to 20 cm insulation. This way, you do not have to break open the floor to create a warm feeling in your dwelling.</p>	<p>question 5, answer A AND question 11, answer A</p>
<p>Your perfectly insulated floor gives you warm feet. An NZEB dwelling has 15 to 20 cm floor insulation. Even if you do not reach this level, it will probably not be necessary to insulate more. Nevertheless, there are simple solutions, because you have a basement. Isolating your basement ceiling will improve the insulation of your floor.</p>	<p>question 5, answer A AND question 11, answer C</p>
<p>A non-insulated floor will give you cold feet. You do not have a basement, which makes it complicated to install 15 to 20 cm of floor insulation. Floor insulation is a must when starting a deep renovation. Link this measurement with a new floor finishing, the installation of a central heating system of the renovation of the technical installations.</p>	<p>(question 5, answer B OR answer C) AND question 11, answer A</p>

Similar algorithms are applied for other parts of the renovation advice, e.g. when showing best practice examples of renovations, the options for renovation coaching, information on local subsidies, etc.

6.2.6 Privacy issues

Due to privacy issues, official EPC data is not published.

As an alternative, the tool only publishes estimations. These are based on open data. The communicated outputs are limited to seven categories: the labels A to G. Many different possible combinations can lead to a certain EPC label. This way, data is anonymized.

A privacy disclaimer is prominently shown at the bottom of each HTML tab of the tool. Here, following issues are explained to the user:

The EPC labels communicated in the tool are indicative estimations and cannot replace an official EPC audit. The owner of the tool is not responsible for abuse of the (outputs of the) tool

⁴ <https://www.leiedal.be/renben>

Data inputted in the questionnaire will only be used for policy reasons. Users can prevent this use. Data will never be transferred to third parties.

Cookies can be placed on your computer, but only to improve the experience on the site, and not to monitor your internet history.

Front end design

The objective was to design an attractive, user-friendly tool. In the front-end design of the tool, this consists of a graphical design of all HTML s, plus a wireframe-design. The figure below shows the wireframe design, which the logic of HTMLs by clicking on several buttons in each HTML.

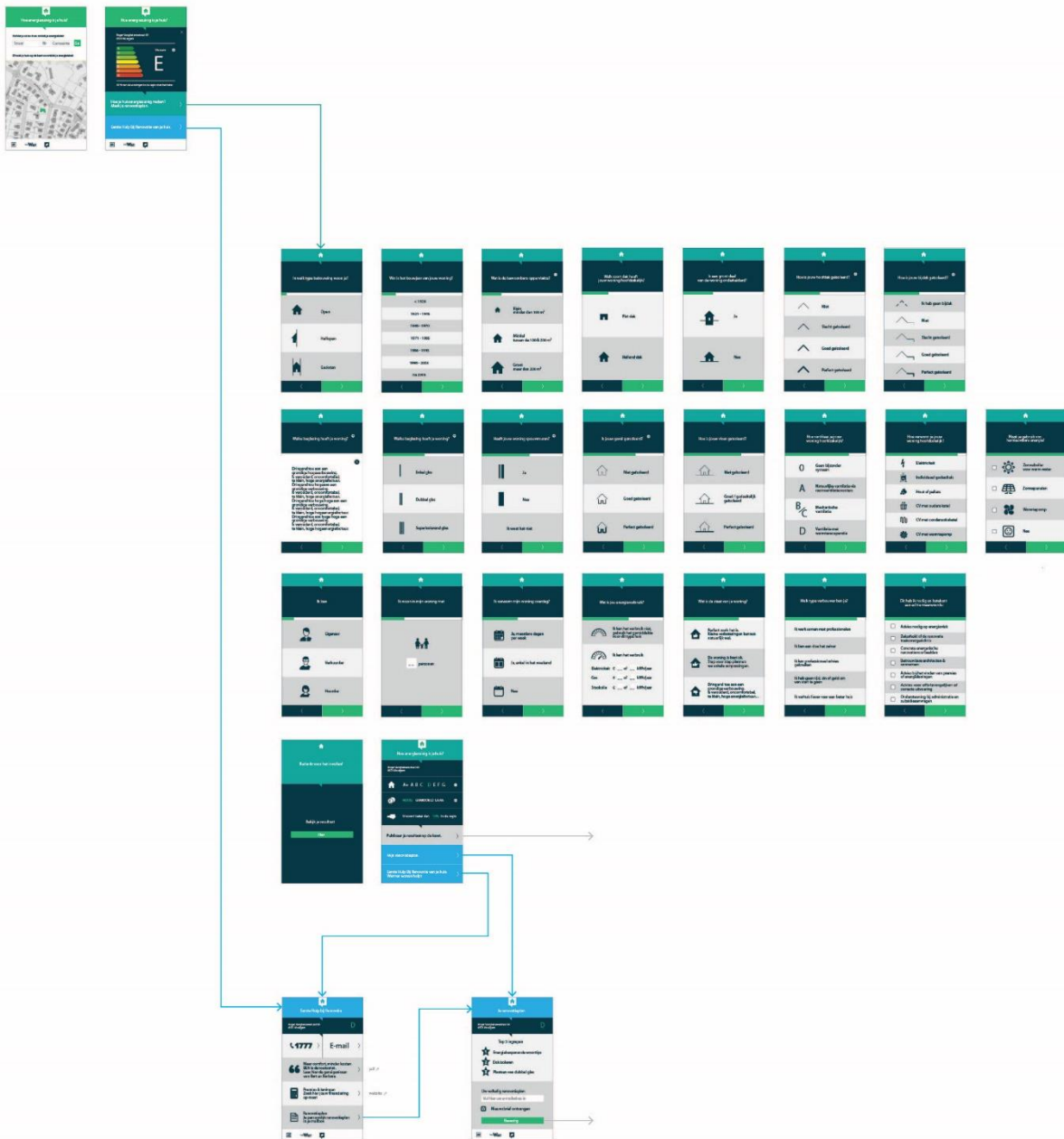


Figure: wireframe of My Energy Compass

6.2.7 Back-end development

The tool is designed in HTML5. This means that it is responsive to all common devices and platforms: desktop, laptop, tablet, smartphone.

The tool is developed in Drupal. Drupal is a free and open source content-management framework written in PHP. Drupal provides a back-end framework for at least 2.3% of all websites worldwide – ranging from personal blogs to corporate, political and government sites. Drupal offers a sophisticated application programming interfaces (APIs) for developers, basic website installation and administration of the framework require no programming skills.

For the development of the tool, several APIs were applied, e.g. to create a database with all answers of the users, to carry out all calculations and algorithms (generate improved estimate of EPC label, generate the NZEB-renovation advice etc.), to create tailor-made .pdf files (renovation reports) and e-mails, to incorporate the map with search function. To create the map, GIS was used in combination with the background of OpenStreetMaps.

The tool has been tested extensively. The application “Browserstack” was used in order to detect bugs in multiplicity number of browsers (and browser versions), for different kind of devices.

The tool is hosted on an external server, to secure its stability.

6.3 POTENTIALS AND LIMITATIONS OF THE TOOL

Within REFURB, an online tool has been developed by Leiedal to ensure market uptake of renovation packages in Leiedal’s region. The tool targets individual homeowners and is linked to the first steps of the customer journey.

However, the following limitations have to be taken into account:

- The indicative energy label is only visualised for individual residential buildings. Results cannot be generated for multi-family residences, non-residential buildings and mixed-use buildings.
- The geographical scope is currently limited to Leiedal’s region, as the associated EPC database and GIS layers were only available for this region. Expansion to the whole region of Flanders is possible when the corresponding EPC and GIS data is acquired.
- EPC data is not publicly available in Flanders. In regions or Member States with publicly available EPC databases, the visualization of the energy label can be implemented more easily.
- The energy performance assessment methodology is based on the EPC method for residential, existing buildings in Flanders. The result and corresponding energy label can differ for other regions as the energy performance calculation can differ.

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

The greatest potential for online tools such as *My Energy Compass* is when used as part of a wider strategy or programme, covering the whole customer journey to renovation. There should be synergy when complemented with other tools or services that link to other steps in the customer journey. In Leiedal’s case, this is illustrated with the Renovation Coach service. Other options could be to develop a similar online tool or service for the next steps in the customer journey, for instance focusing on selecting suppliers and providing support during installation and payment of the construction works.

7. Conclusion

This chapter has collected the main findings observed throughout the completion of this report. The work done in the scope of this report includes following considerations:

- Link of the work to the previous tasks in order to maintain smooth transition from one focus subject to the other in the renovation process.
- Analysis of the existing renovation tools.
- Analysis of the tools with respect to the customer journey.
- Development of the renovation tool specially for the scope of this project

The main conclusions are presented here below:

- 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:
 - o User friendly
 - o Have appealing, intuitive and transparent interface
 - o Should be easy to follow (it should be easy to fill in information)
 - o Should not be too detailed and not require too much time spent.
 - o 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.

8 Reference list

The Customer Journey related to energy saving by VNG Region Friesland, NL.

Value Proposition Design by Alexander Osterwalder -

<http://businessmodelalchemist.com/blog/2012/08/achieve-product-market-fit-with-our-brand-new-value-proposition-designer.html>

Business Model Canvas by Alexander Osterwalder - <http://www.slideshare.net/timdelhaes/the-pitch-method-busines-model-canvas-v2>

Lean Start Up by Eric Reise - www.52weekturnaround.com/lean-startups-brussels-2014/.

Annex: Collection of feedback from partners

1. DENMARK

A. DESCRIPTIVE TOOLS

Descriptive tool to support renovation - Sparenergi

1. Please specify name of the tool?
Sparenergi "Save energy" www.sparenergi.dk
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
Yes it is web based. www.sparenergi.dk
3. Is tool for free or has to be paid?
It is free to all.
4. Is there institution, public body, commercial body that stands behind the tool?
The institution that stands behind web page is Energistyrelsen (Danish Energy Agency). Danish Energy Agency is responsible for entire Danish energy sector's value chain from production and energy supply to energy consumption, energy efficiency and savings and technology monitoring.
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
Tool is exceptionally rich of useful information if one wish to energy renovate its house. Quality of information is very high and at the same time language and presentation is adjusted to ordinary house owner who does not have to be building expert. Information are provided with easy to understand language, examples, good advices, illustrations, energy and money saving potential. Moreover, information is divided into several categories depending on what one wish to work with.
Tool includes guidelines depending if one wish to renovate house or apartment.
Especially good tool available on the www.sparenergi.dk is building guide where 15 most typical building typologies are gathered and described. Each building typology is provided with guidelines on possible renovation solutions, and energy and economy saving potentials.
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).

Tool is built so that its level can be adjusted for private house owner, public employee, industrial employee.

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).

Yes and No. Tool includes some simple energy/money saving calculator for, for example, changing light bulbs to LED or estimate saving potential when changing heating source. However these are very simple tools and do not allow holistic renovation approach.

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).

Tool support mostly initial stage of the renovation and facilitate decision process when one considers renovate/not renovate and what are my options.

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?

Web page do not provide statistics on amount of visitors but Sparenergi has recently (20th May 2017) created Facebook page where it is visible that there is approximately 300 followers.

10. What stages in the customer journey the tool can be applied to?

Tool can support house owner from step 1 to 6.



11. Is the tool updated regularly? If yes, is that information available?

Tool is continuously updated and improved with new features. Newsletter can be send for free 4 times a year if one would like to receive new information.

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

Yes, tool is intuitive. However, amount of information might make it overwhelming for the house owner that is potentially interested in its house energy renovation.

13. Does tool require inputs? (Yes, No, if yes what kind)?

Only simple calculation tools mentioned earlier. Sometimes only house address is required.

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- **X Technical information – for professionals**
- **X Economical saving potentials due to energy renovation.**
- **X Good practice examples, reference projects.**
- Specific tailored solutions / X energy and cost saving.
- **X Calculation examples of financial subsidies.**
- **X Energy certification rules and fees.**

- **X Renewable energy.**
- Courses, workshops, seminars, conferences.
- **X Tips and hints to save energy (low hanging fruits).**
- Energy saving oriented research results – Front Edge information.
- Other (please specify.....)

Descriptive tool to support renovation - Byggerienergi

1. Please specify name of the tool?
Byggerienergi “Buildings and energy”
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
Yes, tool is web page. <http://www.byggerienergi.dk/>
3. Is tool for free or has to be paid?
Tool is available to all and is free.
4. Is there institution, public body, commercial body that stands behind the tool?
**The institution that stand behind <http://www.byggerienergi.dk/> is called Videncenter for energibesparelse i bygninger “Knowledge center for energy saving in buildings” . The center collects and distributes specific and practical knowledge on possibilities to reduce energy in buildings.
Center is the organization working under the Danish Energy Agency.**
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
Quality of information is high. Provided solutions are of great value and can be applied to specific renovation projects. Solutions are sorted with respect to house/apartment and then with respect to envelope and systems and then with respect to specific construction and component. Tool includes interface to filtrate information of interest. The output is provided in form of PDF documents that can be accessed online or downloaded. The page includes also number of check list that would guide house owner through check of his house condition and compare it with recommendations from present building regulations and good practice. Moreover, on the page can be found recent building legislations, educations within energy in buildings, inspirations from renovation cases, technical compendiums such as “The little blue book”, “Technical assignments”, useful links and guide movies.
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
Tool is dedicated to home owners, and to facilitate craftsmen.

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).

Yes, tool includes two calculation tools. One tool is to calculate saving of heating fuel (also price reduction) and second tool is to calculate condensation risk in the building envelope. Both tools have user friendly interfaces where house owner is guided step by step through different renovation possibilities.

Moreover, webpage include guides for moisture membrane application and heat pump installation.

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).

Tool supports, initial, and partly detailed stage. Tool can be also used as reference during execution stage.

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?

No statistics are available for webpage but Facebook page is followed by 1200 people, Twitter is followed by 150 people and LinkedIn page is followed by 1100 people.

10. What stages in the customer journey the tool can be applied to?

Tool support step 1-4.



11. Is the tool updated regularly? If yes, is that information available?

Yes, it seems tool is maintained and updated regularly. Everyone can sign in to regularly receive newsletters.

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

Tools interface is very intuitive. Searching for the information should be fast and efficient for everyone.

13. Does tool require inputs? (Yes, No, if yes what kind)?

Only calculation tools integrated in the tool require inputs.

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- **X Technical information – for professionals.**
- **X Economical saving potentials due to energy renovation.**
- **X Good practice examples, reference projects.**
- **X Specific tailored solutions / energy and cost saving.**
- Calculation examples of financial subsidies.
- Energy certification rules and fees.
- **X Renewable energy.**

- Courses, workshops, seminars, conferences.
- **X Tips and hints to save energy (low hanging fruits).**
- **X Energy saving oriented research results – Front Edge information.**
- Other (please specify.....)

Descriptive tool to support renovation - Boligejer

1. Please specify name of the tool?
boligejer.dk/
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
<https://boligejer.dk/>
3. Is tool for free or has to be paid?
Page is free to all.
4. Is there institution, public body, commercial body that stands behind the tool?
<https://boligejer.dk/> is linked to erhvervsstyrelsen which is organisation that facilitates and creates supportive environment for industrial growth in Denmark and on the digital market.
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
Tool is worth recommendation because it includes sorted and formulated in an easy to follow guide on how to build, rebuild or renovate the house. Guide is based on the best practice information and provides the house owner an essential knowledge he/she should be aware of before starting the project. Tool include also guides about selling and buying procedure which is irrelevant to this report and REFURB project.
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
Tool is dedicated to private house owner.
7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).
No, there is no calculation tool.
8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).
Planning and initial stage are supported by the tool. However, tool provides as well guidelines about economy planning and commissioning of the executed work therefore some of the information in the tool might be very useful at the later stage of the renovation process.

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?
No statistics are available.

10. What stages in the customer journey the tool can be applied to?

11. Tool can be used in Step 3 (Becoming active) and Step 4(Considering) and partly as well Step 7 (Installation and payment) where tool could mostly support general procedure of commissioning and quality check for technical acceptance.



12. Is the tool updated regularly? If yes, is that information available?
That information is not available.

13. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?
Yes, it is intuitive and graphical is also good. Tool contains little portion of information and therefore is expected not to be overwhelming for the house owner planning the renovation.

14. Does tool require inputs? (Yes, No, if yes what kind)?
No, it does not require any form of input.

15. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- Technical information – for house owners.
- Technical information – for professionals.
- Economical saving potentials due to energy renovation.
- Good practice examples, reference projects.
- Specific tailored solutions / energy and cost saving.
- Calculation examples of financial subsidies.
- Energy certification rules and fees.
- Renewable energy.
- Courses, workshops, seminars, conferences.
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- **X tool includes descriptive information of the building/renovation proves including (economy, planning, permissions, local rules, construction acceptance)**

B. CALCULATION TOOLS

Calculation tool to support renovation - Besparelsesberegner

1. Please specify name of the tool?
Besparelsesberegner – “Saving calculator
2. If the tool is accessible through web page please provide the link? If tool is provided in another form then please specify?
Tool is available on the web page <http://www.byggeriogenergi.dk/vaerktoejer/> which is owned and maintained by Vindecener for Energibesparelser i Bygninger “Knowledge center for energy saving in buildings”.
3. Is tool for free or has to be paid?
Free.
4. Is there institution, public body, commercial body that stands behind the tool?
Behind the tool stands “Knowledge center for energy saving in buildings” . The center collects and distributes specific and practical knowledge on possibilities to reduce energy in buildings. Center is the organization working under the Danish Energy Agency. Tool is based on Danish energy performance compliance tool Be15 which is used to calculate buildings energy frames compliance with the Danish Building Regulation.
5. Is the tool updated regularly? Is it known when was the tool last updated?
Yes, tool is updated and updates are visible to the user.
6. Is the tool mandatory or voluntary?
Tool is voluntary.
7. Is the tool aimed for professionals, homeowners, banks/funds or other?
Tool is aimed for homeowners but could be as well used by banks.
8. Does the tool require information about building present energy performance to perform calculation? (for example heating/electricity energy use for last year, qualitative estimate: good, average, poor, other...)
Used resources for heating before renovation should be provided, for example, quantity of burned oil or gas, or volume or kWh of district heating . As well present construction elements insulation properties, installation and windows properties must be provided.
9. What level of information about the building must be provided to perform calculation?

- a. Low (for example - location and year of construction)
 - b. Medium (location, year of construction, type of heating/cooling system, ventilation)
 - c. **X High (precise information about construction and installation components)**
10. Which of the following output does the tool provide (indicate with X)?
- **X Energy saving**
 - Energy demand
 - CO2 reduction
 - Comfort improvement
 - Building label
 - **X Money saving**
 - Renovation cost estimate
 - Payback time
 - Other...
11. Does the tool focus on specific renovation work (for example, only insulation, only installations, only windows change, other)?
- No, it covers envelope, installations and windows improvement.**
12. Does the tool provide opportunity for calculation of multiple components of the building?
- Yes.**
13. Does the tool give possibility for implementing renewable energy sources?
- Yes. Heat pump and solar collectors.**

Calculation tool to support renovation - Husetsweb

1. Please specify name of the tool?
Husetsweb
2. If the tool is accessible through web page please provide the link? If tool is provided in another form then please specify?
Yes. <http://modstroem.husetsweb.dk/>
3. Is tool for free or has to be paid?
Tool is free of charge.
4. Is there institution, public body, commercial body that stands behind the tool?
There is commercial institution Modstrøm that is electric provider.
5. Is the tool updated regularly? Is it known when was the tool last updated?
No, it is not known.

6. Is the tool mandatory or voluntary?

Tool is voluntary.

7. Is the tool aimed for professionals, homeowners, banks/funds or other?

Tool is for homeowners.

8. Does the tool require information about building present energy performance to perform calculation? (for example heating/electricity energy use for last year, qualitative estimate: good, average, poor, other...)

Yes, bills and meter usage for the last year for heating, electricity and water are required.

9. What level of information about the building must be provided to perform calculation?

a. Low (for example - location and year of construction)

b. X Medium (location, year of construction, type of heating/cooling system, ventilation)

c. High (precise information about construction and installation components)

10. Which of the following output does the tool provide (indicate with X)?

- **X Energy saving**
- Energy demand
- CO2 reduction
- Comfort improvement
- **X Building label**
- **X Money saving**
- **X Renovation cost estimate**
- **X Payback time**
- **X Financing cost**

11. Does the tool focus on specific renovation work (for example, only insulation, only installations, only windows change, other)?

Tool focuses more on electricity saving and “low hanging fruits”. For example, it takes into account energy rating of el. consuming apparats, such as, washing machine, fridge, lamps. But it also provides estimate solution for installation improvement and envelope thermal improvement.

12. Does the tool provide opportunity for calculation of multiple components of the building?

Yes/No. Envelope improvements are very roughly considered.

13. Does the tool give possibility for implementing renewable energy sources?

Not exactly, but they are mentioned with regards to present installations in the building.

Calculation tool to support renovation – Husetsenergi beregner

1. Please specify name of the tool?
Husetsenergi beregner "House energy calculator"
2. If the tool is accessible through web page please provide the link? If tool is provided in another form then please specify?
<http://beregner.husetsenergi.dk/>
3. Is tool for free or has to be paid?
Free
4. Is there institution, public body, commercial body that stands behind the tool?
Behind calculation tool is provided by Husetsenergi which is a part of Scanenergi. Husetsenergi is a consulting organization advising private home owners, komunes, and energy providers.
5. Is the tool updated regularly? Is it known when was the tool last updated?
This information is not provided.
6. Is the tool mandatory or voluntary?
It is voluntary.
7. Is the tool aimed for professionals, homeowners, banks/funds or other?
Tool is aiming at private homeowners. Two tools are available one for all year buildings and one for summer houses.
8. Does the tool require information about building present energy performance to perform calculation? (for example heating/electricity energy use for last year, qualitative estimate: good, average, poor, other...)
Yes, either energy use for heating and electricity and water use or yearly cost should be provided.
9. What level of information about the building must be provided to perform calculation?
 - a. Low (for example - location and year of construction)
 - b. X Medium (location, year of construction, type of heating/cooling system, ventilation)**
 - c. High (precise information about construction and installation components)
10. Which of the following output does the tool provide (indicate with X)?
 - Energy saving
 - Energy demand
 - **X (partly) CO2 reduction**
 - Comfort improvement
 - Building label
 - **X Money saving**
 - **X Renovation cost estimate**
 - **X (estimate) Payback time**
 - Other...

11. Does the tool focus on specific renovation work (for example, only insulation, only installations, only windows change, other)?
No, several renovation issues are included.
12. Does the tool provide opportunity for calculation of multiple components of the building?
Tool provides multiple feedback to what could be improved in the building. Improvements are ranging from larger investments, such as for example, envelope thermal improvement to small “low hanging fruits” improvements such as, new circulation pump.
13. Does the tool give possibility for implementing renewable energy sources?
No, but if there are renewables already installed then they are somehow included in the calculation.

1. BELGIUM

A. DESCRIPTIVE TOOLS

Descriptive tool to support renovation - Ren2BEN

1. Please specify name of the tool?
Ren2BEN
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
The Ren2BEN-tool is developed within the RenBEN-project, a project subsidized by the Flemish Government. On this website you can find more information on the RenBEN-project: <http://www.warmerwonen.be/renben/>
3. Is tool for free or has to be paid?
For the moment this tool is for free. As this tool is using the server of building company Bostoën, the tool cannot yet be distributed all over Flanders. Results are send to the server of Bostoën and updates can only made by Bostoën. Nevertheless, if for example the Flemish government would broadly distribute and manage the tool, this tool can easily be used all over Flanders.
4. Is there institution, public body, commercial body that stands behind the tool?
Bostoën (building company) for the RenBEN project
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
The Ren2BEN tool is an application for renovation coaches with minimal technical skills.

It can be used on site (in the house) to get the best renovation advice for each component (roof, wall, floor, windows, heating, ventilation or renewable energy) of the house to renovate by answering a series of questions with Yes/No.

The app works as follows:

- The renovation coach answers through the app a series of questions (by yes or no) for each component of the house and gets an advice for the best solution for this component in a detailed description).
- The app sends this best solutions to the renovation coach in a mail message.
- The renovation coach can use these solutions to make a final overall advice for the homeowner.

6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).

A renovation coach with a small technical background

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).

No, the tool gives the best solution for each part of the house with mention of the recommended values to reach an NZEB level, but this tool does not make calculations.

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).

This tool can be used to produce an advice before the start of the renovation process, to get people interested in and informed about doing an NZEB renovation and to give them a starting point when they contact an architect or contractor to execute their renovation to NZEB.

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?

As this tool is not yet widely spread on the market and only used in the RenBEN-project, statistics on users of the tool are not yet available.

10. What stages in the customer journey the tool can be applied to?

Step 3: Becoming active

Step 4: Considering the options



11. Is the tool updated regularly? If yes, is that information available?

Yes, the tool is still under review and is updated regularly by the developer of the tool, the building company Bostoën.

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

The tool is an user friendly app with a sober but attractive interface.

13. Does tool require inputs? (Yes, No, if yes what kind)?

Yes, this tool requires input: both input on the project and the answers to the asked questions (yes/no/a number) are needed to get a solution.

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- **X Technical information – for professionals.**
- Economical saving potentials due to energy renovation.
- Good practice examples, reference projects.
- **X Specific tailored solutions / energy and cost saving.**
- Calculation examples of financial subsidies.
- **X Energy certification rules and fees.**
- Renewable energy.
- Courses, workshops, seminars, conferences.
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- Other (please specify.....)

Descriptive tool to support renovation – Website Ecobouwers.be

1. Please specify name of the tool?

Website Ecobouwers.be

2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?

<https://www.ecobouwers.be>

3. Is tool for free or has to be paid?

Free

4. Is there institution, public body, commercial body that stands behind the tool?

BBL = Bond Beter Leefmilieu (Independent network organisation that joins different nature and environmental organisations in Flandres)

5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)

The website of Ecobouwers is a Flemish independent website on sustainable living and building gives an overload of in depth information on environmental and energy themes, such as on renovation of houses to NZEB. A differentiation is made between information for individuals, professionals and schools.

This website can be used by individuals with renovation or building plans and by professionals to get more informed on sustainable building and living.

On this online platform you can find:

- a forum to ask questions, open discussion and share experiences
- pictures and technical sheets on sustainable and energy efficient example houses
- articles on building sustainable and energy conscious with in depth information on certain techniques
- a list of construction professionals
- information on the yearly Ecobouwers Opening day

6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).

Individuals and professionals

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).

This website includes calculation tools (e.g. CO₂-calculator) and some links to calculation tools (e.g. Zonnekaart) are provided.

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).

All stages of the renovation process are supported.

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?

Not known.

10. What stages in the customer journey the tool can be applied to?

- Step 1: Becoming aware**
- Step 2: Becoming interested**
- Step 3: Becoming active**
- Step 4: Considering the options**
- Step 5: Financing**
- Step 6: Selecting a supplier**



11. Is the tool updated regularly? If yes, is that information available?

Yes, this website is updated regularly with new information. Everyone can subscribe to the newsletter to get the latest news by mail.

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

The website and tools are user friendly and visually attractive.

13. Does tool require inputs? (Yes, No, if yes what kind)?

**Some calculation tools on the website/platform require input like numbers.
Questions can be asked on the online forum.**

14. Which of the following information can be found in the tool? Please indicate with X?
- Facts about country climate and energy strategies.
 - **X Technical information – for house owners.**
 - Technical information – for professionals.
 - **X Economical saving potentials due to energy renovation.**
 - **X Good practice examples, reference projects.**
 - **X Specific tailored solutions / energy and cost saving.**
 - **X Calculation examples of financial subsidies.**
 - **X Energy certification rules and fees.**
 - **X Renewable energy.**
 - Courses, workshops, seminars, conferences.
 - **X Tips and hints to save energy (low hanging fruits).**
 - Energy saving oriented research results – Front Edge information.
 - Other (please specify.....)

Descriptive tool to support renovation - Premiezoeker

1. Please specify name of the tool?
Premiezoeker (EN: Search engine for grants)
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
<https://www.premiezoeker.be/>
3. Is tool for free or has to be paid?
Free
4. Is there institution, public body, commercial body that stands behind the tool?
Public body: Flemish government
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
“Premiezoeker” is the official search engine of the Flemish Government to look up available grants and subsidies, including grants related to energy saving or renovation measures
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
Homeowners, but it can be used by other parties as well as it is publicly accessible

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).

No

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).

Initial (i.e. looking for financial support)

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?

It is an official tool initiated by the regional government

10. What stages in the customer journey the tool can be applied to?



Stage 5 Financing

11. Is the tool updated regularly? If yes, is that information available?

Yes, it is up-to-date with the grant system

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

It is rather straightforward and functional.

13. Does tool require inputs? (Yes, No, if yes what kind)?

Yes. Users have to specify the location of the residence, which works they are planning to do, and the owner status (homeowner, renter etc.)

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- Technical information – for house owners.
- Technical information – for professionals.
- Economical saving potentials due to energy renovation.
- Good practice examples, reference projects.
- Specific tailored solutions / energy and cost saving.
- Calculation examples of financial subsidies.
- **Energy certification rules and fees.**
- Renewable energy.
- Courses, workshops, seminars, conferences.
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- Other (please specify.....)

Here please specify other relevant issues

Descriptive tool to support renovation - Renovatiestarter

1. Please specify name of the tool?
Renovatiestarter (EN: "Start to renovate")
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
<http://renovatiestarter.be/>
3. Is tool for free or has to be paid?
Free
4. Is there institution, public body, commercial body that stands behind the tool?
Pixii – research organization in Nearly Zero Energy Building
The tool was developed as part of the research project Renofase (<https://www.renofase.be/>)
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
"Renovatiestarter" provides homeowners with interest to renovate their homes a comprehensive overview of possible renovation measures. Measures are categorized per building component: Building envelope (roof, wall, floor, windows & doors, airtightness) and technical installations (heating, domestic hot water, ventilation, renewable energy and sun shading). Each measure is explained more in detail: Main advantages, points of attention, and additional recommendations. Homeowners can select renovation measures and generate a report with overview of their selection.
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
Homeowners.
However, the tool is useful for energy consultants and architects as well, as it provides accurate technical information which can be used in the communication towards the homeowner. Moreover, the output of the tool (a list of renovation measures) is intended as a medium between the homeowner and the building professional
7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).
No
8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).

Preliminary design and technical design

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?

No statistics available

10. **What stages in the customer journey the tool can be applied to?**



4 Considering the options

11. Is the tool updated regularly? If yes, is that information available?

Unknown. The tool was launched in Oktober 2017

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

It is intuitive and user friendly as the language is adapted to the user and thus not too technical. The interface is visually attractive.

13. Does tool require inputs? (Yes, No, if yes what kind)?

Users have to select the renovation options relevant for them

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- **X Technical information – for professionals.**
- Economical saving potentials due to energy renovation.
- Good practice examples, reference projects.
- **X Specific tailored solutions / energy and cost saving.**
- Calculation examples of financial subsidies.
- Energy certification rules and fees.
- Renewable energy.
- Courses, workshops, seminars, conferences.
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- Other (please specify.....)
- Here please specify other relevant issues

Descriptive tool to support renovation – Build your home/vind uw aannemer

1. Please specify name of the tool? **Build your home / vinduwaannemer (EN: Find your contractor)**

2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?

<http://www.vinduwaannemer.be>
<http://www.buildyourhome.be>

3. Is tool for free or has to be paid? **Free**
4. Is there institution, public body, commercial body that stands behind the tool? **Commercial parties: sectoral federations of contractors**
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
“Vind uw aannemer” and “build your home” are both search engines to find suitable contractors. The first is targeted to specialized contractors, the second is targeted to general contractors. There is an option to only search “Energiebewuste aannemers” (EN: Energy conscious contractors”) and “BEN aannemers” (EN: NZEB contractor)
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
Private homeowners
7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process). **No**
8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible). **Contracting**
9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)? **Not known**
10. What stages in the customer journey the tool can be applied to?



6 Selecting suppliers

11. Is the tool updated regularly? If yes, is that information available? **Not known**
12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive? **The search engine is straight forward**
13. Does tool require inputs? (Yes, No, if yes what kind)? **Users only have to indicate their region of interest**
14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- Technical information – for house owners.
- Technical information – for professionals.
- Economical saving potentials due to energy renovation.
- Good practice examples, reference projects.
- Specific tailored solutions / energy and cost saving.
- Calculation examples of financial subsidies.
- Energy certification rules and fees.
- Renewable energy.
- Courses, workshops, seminars, conferences.
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- **Other (please specify.....) Contact information of building professionals (i.e. contractors)**

Descriptive tool to support renovation – Samen Sterker

1. Please specify name of the tool? **Samen Sterker (EN: Stronger Together)**
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?

<https://www.samensterker.be/>
3. Is tool for free or has to be paid? **Free**
4. Is there institution, public body, commercial body that stands behind the tool? **Samen Sterker is a cooperative**
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)

“Samen Sterker” is a platform which organizes group purchases of energy efficiency related products or renovation measures such as green energy, green vehicles, cavity wall insulations, PV-panels, solar boilers etc. The actions targeted are local (for instance, the province of Antwerp), but there are actions organized in other regions as well.
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible). **Private homeowners**
7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process). **No**

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible). **Contracting, execution**

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)? **There are various figures available on the website:**

- **1000 PV-panel projects (reported on 31/12/2016)**
- **1.700 other renovation measures (reported on 31/12/2016)**
- **87.000 clients switching to a green energy provider (reported on 10/05/2017)**

10. What stages in the customer journey the tool can be applied to?



6 Selecting suppliers

7 Installing and payment

11. Is the tool updated regularly? If yes, is that information available? **Yes, new actions are posted periodically**

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive? **The tool is intuitive and straightforward**

13. Does tool require inputs? (Yes, No, if yes what kind)? **Depending on the selected renovation measure, users have to provide various technical specifications in order to obtain a first indication and offer**

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **Technical information – for house owners.**
- Technical information – for professionals.
- **Economical saving potentials due to energy renovation.**
- Good practice examples, reference projects.
- **Specific tailored solutions / energy and cost saving.**
- Calculation examples of financial subsidies.
- Energy certification rules and fees.
- Renewable energy.
- Courses, workshops, seminars, conferences.
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- Other (please specify.....)

Here please specify other relevant issues....

Descriptive tool to support renovation – Energie ID

1. Please specify name of the tool?

Energie ID

2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?

<https://www.energieid.be/>

3. Is tool for free or has to be paid?

Free

4. Is there institution, public body, commercial body that stands behind the tool?

The tool is linked to an energy consultant / engineering firm

5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)

“Energie ID” is an online platform in which users can enter their energy consumption figures on a regular basis. It is possible to automate this process by linking to a digital meter. Users can join groups to compare their consumption with the average consumption of the group.

6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).

Homeowner

However, it can be useful for building professionals as well (engineering consultants, energy consultants) to monitor energy consumption of their clients

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).

No

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).

Post-execution and in-use

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?

Unknown. The tool was launched in 2011 and is updated regularly

10. What stages in the customer journey the tool can be applied to?



8 experience

10 sharing

11. Is the tool updated regularly? If yes, is that information available?

Yes

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

The tool is intuitive. It is possible to integrate with data sources such as smart meters etc.

13. Does tool require inputs? (Yes, No, if yes what kind)?

Yes, consumption data

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- Technical information – for house owners.
- Technical information – for professionals.
- Economical saving potentials due to energy renovation.
- Good practice examples, reference projects.
- Specific tailored solutions / energy and cost saving.
- Calculation examples of financial subsidies.
- Energy certification rules and fees.
- Renewable energy.
- Courses, workshops, seminars, conferences.
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- **X Other (please specify.....) Consumption data overview and benchmarking**

Here please specify other relevant issues....

Descriptive tool to support renovation – Bouwinfo/Livios

1. Please specify name of the tool? **Bouwinfo / Livios**

2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?

<https://www.bouwinfo.be/>

<https://www.livios.be>

3. Is tool for free or has to be paid?

Free

4. Is there institution, public body, commercial body that stands behind the tool?

Commercial organisations

5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
“Bouwinfo” and “Livios” are two internet fora. Both websites provide information with regards to the building process. This is not limited to renovation but also applicable for new buildings. Participants can discuss building topics in the fora. The websites also include search engines for contractors or building products, financial information etc.

6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
Private homeowners

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).
No

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).
Initial, execution and post-execution

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?
Livios claims to have more than 500.000 visitors each month.

10. What stages in the customer journey the tool can be applied to?



- Stage 1 becoming aware**
- Stage 2 becoming interested**
- Stage 3 becoming active**
- Stage 4 considering the options**
- Stage 10 sharing**

11. Is the tool updated regularly? If yes, is that information available?
Yes

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?
Yes, the website is easy accessible

13. Does tool require inputs? (Yes, No, if yes what kind)?
In order to be able to participate in the internet fora, users need to register

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
 - **Technical information – for house owners.**
 - Technical information – for professionals.
 - Economical saving potentials due to energy renovation.
 - **Good practice examples, reference projects.**
 - Specific tailored solutions / energy and cost saving.
 - Calculation examples of financial subsidies.
 - Energy certification rules and fees.
 - Renewable energy.
 - Courses, workshops, seminars, conferences.
 - **Tips and hints to save energy (low hanging fruits).**
 - Energy saving oriented research results – Front Edge information.
 - **Other (please specify.....) Experiences of other users**
15. Here please specify other relevant issues....

B. CALCULATION TOOLS

Calculation tool to support renovation –

Check je huis

1. Please specify name of the tool?
Check je huis
2. If the tool is accessible through web page please provide the link? If tool is provided in another form then please specify?
<https://klimaat.stad.gent/checkjehuis/?q=check-je-huis>
3. Is tool for free or has to be paid?
free
4. Is there institution, public body, commercial body that stands behind the tool?
City Gent, in cooperation with Digipolis for the development
5. Is the tool updated regularly? Is it known when was the tool last updated?
Yes, e.g. on key figures (e.g. prices)
6. Is the tool mandatory or voluntary?
Voluntary
7. Is the tool aimed for professionals, homeowners, banks/funds or other?
Home-owners

8. Does the tool require information about building present energy performance to perform calculation? (for example heating/electricity energy use for last year, qualitative estimate: good, average, poor, other...)

Yes, but rather a qualitative estimate

9. What level of information about the building must be provided to perform calculation?

a. Low (for example - location and year of construction)

b. Medium (location, year of construction, type of heating/cooling system, ventilation)

c. High (precise information about construction and installation components)

10. Which of the following output does the tool provide (indicate with X)?

- Energy saving
- Energy demand
- CO2 reduction
- Energy reduction
- Money saving
- Renovation cost estimate
- Subsidies and grants

11. Does the tool focus on specific renovation work (for example, only insulation, only installations, only windows change, other)?

Yes:

- roof insulation
- wall insulation
- floor insulation
- windows
- heating system
- solar electric
- solar thermal
- green energy

12. Does the tool provide opportunity for calculation of multiple components of the building?

Yes, see components in question 11

13. Does the tool give possibility for implementing renewable energy sources?

Yes:

- solar electric
- solar thermal
- green energy

Calculation tool to support renovation – Zonnekaart

Description:

The “Zonnekaart” (“Solar map”) is an online application made available by the Flemish Energy Agency (VEA). It has the following features:

- Building owners can look up their building and visualize it in a map-viewer
- The tool calculates the potential of the roof of the building for PV panels and solar thermal collectors based on the building’s geometry and solar radiation data. Building owners only have to provide the address of their building to already perform a calculation.
- Next, building owners have the option to modify default settings according to their situation
- The tool provides useful information for the building owners regarding investment costs, payback times, renewable energy production etc.
- The website generates a report which includes useful information for further support (e.g. list of certified installers, available grants and loans etc.)

1. Please specify name of the tool?

Zonnekaart

2. If the tool is accessible through web page please provide the link? If tool is provided in another form then please specify?

<https://www.energiesparen.be/zonnekaart>

3. Is tool for free or has to be paid?

Free

4. Is there institution, public body, commercial body that stands behind the tool?

Flemish Energy Agency (VEA)

5. Is the tool updated regularly? Is it known when was the tool last updated?

6. Is the tool mandatory or voluntary?

Voluntary

7. Is the tool aimed for professionals, homeowners, banks/funds or other?

Mainly homeowners, but also owners of non-residential buildings such as SMEs, schools etc.

8. Does the tool require information about building present energy performance to perform calculation? (for example heating/electricity energy use for last year, qualitative estimate: good, average, poor, other...)

The user can refine the calculations by providing the following energy related data:

- **PV-panels:**
 - **Average annual electricity consumption [kWh/year]**
- **Solar boilers:**
 - **Performance of solar boiler**
 - **Number of persons, domestic hot water use (liter/person per day) etc.**

9. What level of information about the building must be provided to perform calculation?

The tool calculates the potential of the roof of the building for PV panels and solar thermal collectors based on the building's geometry and solar radiation data. Building owners only have to provide the address of their building to already perform a calculation.

Next, building owners have the option to modify default settings according to their situation. For instance for the calculation of the potential for PV-panels :

- **Function:**
 - **Residential or non-residential**
 - **VAT-tariff**
- **Annual electricity consumption [kWh/year]**
- **Cost information:**
 - **Investment cost PV-system [EUR/kWp]**
 - **Maintenance cost (i.e. replacement of invertors) [EUR/kWp]**
 - **Electricity**
 - a. Low (for example - location and year of construction)
 - b. Medium (location, year of construction, type of heating/cooling system, ventilation)
 - c. High (precise information about construction and installation components)

10. Which of the following output does the tool provide (indicate with X)?

- Energy saving
- Energy demand
- **X CO2 reduction**
- Comfort improvement
- Building label
- **X Money saving**
- **X Renovation cost estimate**
- **X Payback time**
- **X Potential renewable energy production (PV-panels and solar boilers)**

11. Does the tool focus on specific renovation work (for example, only insulation, only installations, only windows change, other)?

PV-panels

Thermal collectors and solar boilers

12. Does the tool provide opportunity for calculation of multiple components of the building?

See previous question

13. Does the tool give possibility for implementing renewable energy sources?

Yes, the potential for solar energy

Calculation tool to support renovation - Energiewinstcalculator

1. Please specify name of the tool?
Energiewinstcalculator
2. If the tool is accessible through web page please provide the link? If tool is provided in another form then please specify?
www.energiesparen.be/energiewinst
3. Is tool for free or has to be paid?
Free
4. Is there institution, public body, commercial body that stands behind the tool?
VEA
5. Is the tool updated regularly? Is it known when was the tool last updated?
Not known
6. Is the tool mandatory or voluntary?
Voluntary
7. Is the tool aimed for professionals, homeowners, banks/funds or other?
Intended for everyone, with target audience being Home-owners; Anyone, very easy to use
8. Does the tool require information about building present energy performance to perform calculation? (for example heating/electricity energy use for last year, qualitative estimate: good, average, poor, other...)
It ask for the composition of the roof, wall, depending on what you want know
9. What level of information about the building must be provided to perform calculation?
 - a. Low (for example - location and year of construction)
 - b. Medium (location, year of construction, type of heating/cooling system, ventilation)**
 - c. High (precise information about construction and installation components)
10. Which of the following output does the tool provide (indicate with X)?
 - **X Energy saving**
 - Energy demand
 - CO2 reduction
 - Comfort improvement
 - Building label
 - **X Money saving**
 - Renovation cost estimate

- Payback time
 - **X Calculate the energy profit for each investment:**
 - Energyprofit by insulating the pitched roof
 - Energyprofit by insulating the cavity of a wall
 - Energyprofit by installing a high performance glass
 - Energyprofit by installing a solar boiler in an existing building
 - Energyprofit by installing solar panels
11. Does the tool focus on specific renovation work (for example, only insulation, only installations, only windows change, other)?
Only specific renovation work, depending on what you ask fi. insulation of the roof, insulation of the wall.
12. Does the tool provide opportunity for calculation of multiple components of the building?
Yes
13. Does the tool give possibility for implementing renewable energy sources?
Yes

1. GERMANY

In Germany there are many tools available, almost too many, as it becomes difficult for homeowners to decide which source to trust. Many of the tools/webpages are descriptive tools, providing extensive information on energetic renovation, renewables, heating technologies, funding options, financing tips, help with finding experts, how to start the renovation process, how to carry out the renovation etc. The tools are easy to find, but it is hard to choose. Most of them are useful, well designed, intuitive and informative, but it might also be useful to visit specialised sites, for example the KfW-page for current information on KfW-funding. It sometimes can be hard to find out, if the information provided in the tool/pages is up to date or which motivation the tool/webpage provider has for providing the service (or who the provider even is).

Maybe a government supported overview page could be useful, in order to help homeowners find the right page/tool for their needs. However, this may put a disadvantage on all those, who are not listed on that page.

The calculation tools require lots of detailed input, which might be overwhelming for some homeowners, but tools requiring less input can never give tailored advice, but only general information.

To sum this up, the tool situation is good in Germany. Homeowners have to make their choice, which source they want to receive their information from. They can find every information and service online, if they look hard enough. If they want to avoid this process, they can always choose to talk to an expert/energy consultant and be informed and advised by them.

A. DESCRIPTIVE TOOLS

Descriptive tool to support renovation - BINE

1. Please specify name of the tool?
BINE Information Service
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
<http://www.energiefoerderung.info/>
3. Is tool for free or has to be paid?
It is at no charge
4. Is there institution, public body, commercial body that stands behind the tool?
FIZ Karlsruhe – Leibniz-Institut für Informationsinfrastruktur GmbH (research institution) → publisher
Ministry for Economic and Energy → financial support

5. Why is the tool worth recommendation? (Quality of information, very informative, professional, provides good overview of possibilities, other...)
- **It provides detailed information subdivided by different regions of Germany**
 - **It allows to specify the search for funding opportunities by different filter:**
 - **New buildings**
 - **Modernization**
 - **Mobility**
 - **The recommended results can be further specified by, e.g.**
 - **Photovoltaic cells**
 - **Energy efficient domestic appliances**
 - **It is possible to gain specific and detailed information for each funding action**
 - **Furthermore contact information and contact persons are available**

6. Is the tool dedicated to private homeowner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible)?
- The tool is dedicated to private households.**

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process)?
- No it doesn't.**

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).
- As a tool to support private households to find financial funding opportunities, it supports at an early stage of any process of new buildings, renovation and mobility.**

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?
- There aren't any statistics available.**

10. What stages in the customer journey the tool can be applied to?

Step 3 Becoming active
Step 4 Considering the offer
Step 5 Financing



11. Is the tool updated regularly? If yes, is that information available?
- The tool is based on the “Förderkompass Energie”, that means an update at the “Förderkompass Energie” should be implemented in this tool automatically.**

12. Is the tool intuitive, is it user friendly, and is the graphical interface neat and attractive?
- **The tool is user friendly and very intuitive;**
 - **It is graphically supported;**

- **It gives a very good and detailed overview;**
- **The filter alleviates the usage.**

13. Does tool require inputs? (Yes, No, if yes what kind)?

- **It requires information about**
 - **The region your action is supposed to be implemented**
 - **What kind of action to you intend to do (new buildings, modernization, mobility)**

14. Which of the following information can be found in the tool? Please indicate with X?

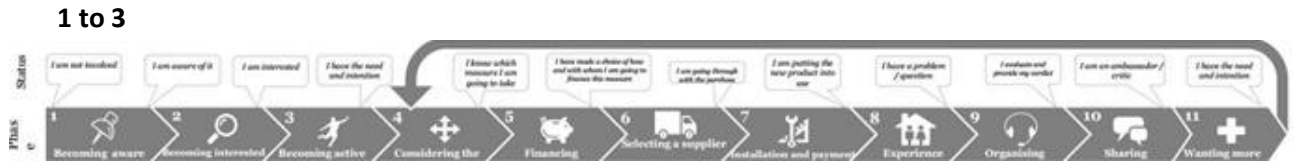
- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- Technical information – for professionals.
- Economical saving potentials due to energy renovation.
- Good practice examples, reference projects.
- Specific tailored solutions / energy and cost saving.
- **X Calculation examples of financial subsidies.**
- Energy certification rules and fees.
- Renewable energy.
- Courses, workshops, seminars, conferences.
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- **X Other (please specify.....)**

15. Here please specify other relevant issues....

Funding opportunities at the European, national and regional level

Descriptive tool to support renovation – energie-experten.org

1. Please specify name of the tool?
energie-experten.org
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
<http://www.energie-experten.org/>
3. Is tool for free or has to be paid?
Free
4. Is there institution, public body, commercial body that stands behind the tool?
The website is hosted by an editorial department and financed by placement of advertisements
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
It is a portal that gives extensive information on all topics regarding energy efficient technologies and energy renovation, you can also start a search for experts (for a specific topic, e.g. new windows) in your region, the experts can register in order to be connected with potential customers. There are several calculation applications integrated in the website.
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
Private home owner, everybody who is interested in energy efficiency in general, as there are not only house-related topics discussed
7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).
Yes, one for heating systems, one for heat pumps, one for Solarenergy, one for electric-heating, one for insulation and one for windows.
8. What stage of the renovation process is supported: initial, detailed, contracting, execution, Post execution? (Multiple answers is possible).
Initial, detailed, contracting
9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?
No
10. What stages in the customer journey the tool can be applied to?



11. Is the tool updated regularly? If yes, is that information available?

Yes, every article is dated, updates are mentioned below articles

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

The website could be more clearly arranged, feels a little overloaded, structure could be improved, but generally you find what you are looking for. The calculation parts are clearly arranged and mostly intuitive.

13. Does tool require inputs? (Yes, No, if yes what kind)?

Yes, if you want a recommendation of experts in your region, you have to enter your name, e-mail and availability and a few details on the measures you want to take.

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- Technical information – for professionals.
- **X Economical saving potentials due to energy renovation.**
- **X Good practice examples, reference projects.**
- Specific tailored solutions / energy and cost saving.
- **X Calculation examples of financial subsidies.**
- Energy certification rules and fees.
- **X Renewable energy.**
- Courses, workshops, seminars, conferences.
- **X Tips and hints to save energy (low hanging fruits).**
- **X Energy saving oriented research results – Front Edge information.**
- **X Other (please specify.....)**

15. Here please specify other relevant issues....

Descriptive tool to support renovation - Energiesparen im Haushalt

1. Please specify name of the tool?
Energiesparen im Haushalt (energy saving in private households)
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
<http://www.energiesparen-im-haushalt.de/energie/bauen-und-modernisieren/modernisierung-haus/altbausanierung.html>
3. Is tool for free or has to be paid?
It is at no charge, but the web-tool contains advertisement.
4. Is there institution, public body, commercial body that stands behind the tool?
The private body vPRESS. GmbH is responsible for this tool
5. Why is the tool worth recommendation? (Quality of information, very informative, professional, provides good overview of possibilities, other...)
 - **It contains specific information about the modernization of old buildings;**
 - **It is very detailed with a particular focus on old buildings;**
 - **It is well-structured, well understandable, and includes good examples;**
 - **It refers to other tools and websites for further information.**
6. Is the tool dedicated to private homeowner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
The tool / sub-link <http://www.energiesparen-im-haushalt.de/energie/bauen-und-modernisieren/modernisierung-haus/altbausanierung.html> is dedicated to private owners. (The general link <http://www.energiesparen-im-haushalt.de/> also provides information for energy consultants.)
7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process)?
It does not include a calculation tool. It contains some calculation example to clarify specific aspects. It refers to a calculation tool where it is possible.
8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).
 - **The tool supports at the initial stage;**
 - **It also supports while processing.**

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?
There aren't any statistics available.

10. What stages in the customer journey the tool can be applied to?

Step 1 Becoming aware

Step 2 Becoming interested

Step 3 Becoming active



11. Is the tool updated regularly? If yes, is that information available?

No specific information available.

12. Is the tool intuitive, is it user friendly, and is the graphical interface neat and attractive?

The tool is user friendly. It is intuitively in general, but the website is a little bit confusing. It is hard to keep an overview about the important information at the beginning, because of advertisements.

13. Does tool require inputs? (Yes, No, if yes what kind)?

Not necessarily

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- Technical information – for professionals.
- **X Economical saving potentials due to energy renovation.**
- Good practice examples, reference projects.
- Specific tailored solutions / energy and cost saving.
- **X Calculation examples of financial subsidies.**
- Energy certification rules and fees.
- Renewable energy.
- Courses, workshops, seminars, conferences.
- **X Tips and hints to save energy (low hanging fruits).**
- Energy saving oriented research results – Front Edge information.
- Other (please specify.....)

Here please specify other relevant issues....

Descriptive tool to support renovation - RENEWA

1. Please specify name of the tool?
RENEWA ('One-Stop-Shop'-Company for energetic renovation)
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
<https://www.renewa.de/>
3. Is tool for free or has to be paid?
It is a service from a company that has to be paid.
4. Is there institution, public body, commercial body that stands behind the tool?
No, a private company offering a service.
5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)
It is an interesting business model. They are offering energetic renovation or single measures for a fixed price (heating, windows, insulation, roof). You can also book additional services like thermography, EPC, disposal of old heating system, economic feasibility study.
6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).
Private homeowner
7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).
No
8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).
Every stage
9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?
No
10. What stages in the customer journey the tool can be applied to?
2 to 11



11. Is the tool updated regularly? If yes, is that information available?
No
12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?
Yes
13. Does tool require inputs? (Yes, No, if yes what kind)?
No
14. Which of the following information can be found in the tool? Please indicate with X?
- Facts about country climate and energy strategies.
 - **X Technical information – for house owners.**
 - Technical information – for professionals.
 - Economical saving potentials due to energy renovation.
 - **X Good practice examples, reference projects.**
 - Specific tailored solutions / energy and cost saving.
 - Calculation examples of financial subsidies.
 - Energy certification rules and fees.
 - **X Renewable energy.**
 - Courses, workshops, seminars, conferences.
 - Tips and hints to save energy (low hanging fruits).
 - Energy saving oriented research results – Front Edge information.
 - Other (please specify.....)
15. Here please specify other relevant issues....

Descriptive tool to support renovation – Zukunft Altbau

1. Please specify name of the tool?

Zukunft Altbau

2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?

<https://www.zukunftaltbau.de>

3. Is tool for free or has to be paid?

Free

4. Is there institution, public body, commercial body that stands behind the tool?

Public body: Climate Protection Agency of Baden-Württemberg, funded by the Ministry for Environment, Climate and Energy Economy of Baden-Württemberg

5. Why is the tool worth recommendation? (quality of information, very informative, professional, provides good overview of possibilities, other...)

Informative, good overview and starting point for different target groups, information on best practice, technical options, funding, consulting possibilities and events + additional information for experts (news, legal news, events for experts), some information is specialized for Baden-Württemberg only.

6. Is the tool dedicated to private home owner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible).

There are three target groups for the tool: private home owners, companies and municipalities and experts.

7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process).

No

8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).

Initial

9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?

No

10. What stages in the customer journey the tool can be applied to?

Stage 1 to 3



11. Is the tool updated regularly? If yes, is that information available?

No, there is no information available on that.

12. Is the tool intuitive, is it user friendly, is the graphical interface neat and attractive?

Yes, modern interface, good structure, easy-to-use

13. Does tool require inputs? (Yes, No, if yes what kind)?

No, no inputs needed

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- **X Technical information – for professionals.**
- **X Economical saving potentials due to energy renovation.**
- **X Good practice examples, reference projects.**
- Specific tailored solutions / energy and cost saving.
- Calculation examples of financial subsidies.
- Energy certification rules and fees.
- **X Renewable energy.**
- **X Courses, workshops, seminars, conferences.**
- Tips and hints to save energy (low hanging fruits).
- Energy saving oriented research results – Front Edge information.
- **X Other (please specify.....)**

15. Here please specify other relevant issues....

There is a download section with good and clearly arranged materials for home-owners, it contains a good informational basis and checklists for the renovation process as well as current information on legal issues and funding options etc.

Descriptive tool to support renovation - Zukunft-Haus and Energieeffizienz-Expertenliste

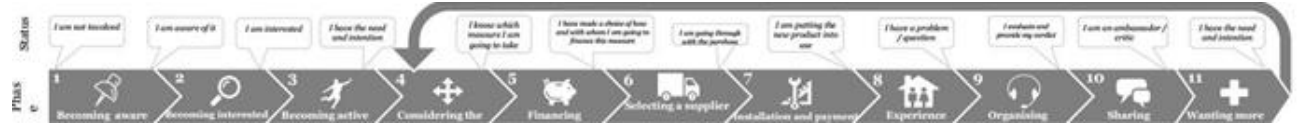
1. Please specify name of the tool?
"Zukunft-Haus" (future house) and "Energieeffizienz-Expertenliste" (list of experts for energy efficiency)
2. If the tool is a web page please provide the link? If tool is provided in another form then please specify (newsletter, book, brochure, other), where can it be found/subscribed?
<https://www.zukunft-haus.info/startseite.html>
<https://www.zukunft-haus.info/tools/energieeffizienz-expertenliste.html>
3. Is tool for free or has to be paid?
The tool is at no charge.
4. Is there institution, public body, commercial body that stands behind the tool?
Responsible for this tool is the German Energy Agency (DENA).
5. Why is the tool worth recommendation? (Quality of information, very informative, professional, provides good overview of possibilities, other...)
 - a. **The tool provides specific information for the planning process and offers advising information in the field of energy**
 - b. **It furthermore provides professional information about legislative issues and different actions for energy savings**
6. Is the tool dedicated to private homeowner, engineer, consultant, architect, banks/financial institutions (multiple answers are possible)?
The tool is dedicated to a wide range of stakeholders. Private households as well as consultants and other stakeholder may use this tool.
7. Does the tool include calculation tool in it? (Is there possibility to perform calculations to support renovation process)?
It does not include a specific calculation tool.
8. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers is possible).
The tool mainly focusses on the initial and planning phase. The tool therefor provides detailed information and further links to other institutions and websites. It also contains information about legal aspects that are relevant for the renovation process.
9. Do you know if tool is broadly used (are there any statistics on amount of visitors, subscribers)?
No information available.

10. What stages in the customer journey the tool can be applied to?

Step 1 Becoming aware

Step 2 Becoming interested

Step 3 Becoming active



11. Is the tool updated regularly? If yes, is that information available?

No information available.

12. Is the tool intuitive, is it user friendly, and is the graphical interface neat and attractive?

a. The tool is user friendly and intuitive

b. The interface is easy to handle

13. Does tool require inputs? (Yes, No, if yes what kind)?

- **The tool requires some information**
- **For using the expert list, it is necessary to give information about the region and if you are eligible for funding**
- **For using the databank for energy efficient buildings, you are supposed to give information about**
 - residential buildings / no residential buildings;
 - what kind of energy efficiency is required;
 - if it is supposed to be renovated or not.
- **If you just want to use the information, that are provided by DENA, no specific information is necessary.**

14. Which of the following information can be found in the tool? Please indicate with X?

- Facts about country climate and energy strategies.
- **X Technical information – for house owners.**
- **X Technical information – for professionals.**
- **X Economical saving potentials due to energy renovation.**
- Good practice examples, reference projects.
- Specific tailored solutions / energy and cost saving.
- Calculation examples of financial subsidies.
- Energy certification rules and fees.
- Renewable energy.
- Courses, workshops, seminars, conferences.
- **X Tips and hints to save energy (low hanging fruits).**
- Energy saving oriented research results – Front Edge information.
- Other (please specify.....)

15. Here please specify other relevant issues....

B. CALCULATION TOOLS

Calculation tool to support renovation – effizienhaus-online

1. Please specify name of the tool?
effizienhaus-online
2. If the tool is accessible through web page please provide the link? If tool is provided in another form then please specify?
<https://application.effizienzhaus-online.de/sanierungsrechner/#?state=0>
3. Is tool for free or has to be paid?
Free
4. Is there institution, public body, commercial body that stands behind the tool?
Commercial body: the company Bosch (Robert Bosch GmbH)
5. Is the tool updated regularly? Is it known when was the tool last updated?
No
6. Is the tool mandatory or voluntary?
Voluntary
7. Is the tool aimed for professionals, homeowners, banks/funds or other?
Home-owners
8. Does the tool require information about building present energy performance to perform calculation? (for example heating/electricity energy use for last year, qualitative estimate: good, average, poor, other...)
Yes, the more detailed information you provide, the more precise the results. For some information you can choose 'unknown' or make an estimation but generally it is better to be precise.
9. What level of information about the building must be provided to perform calculation?
 - a. Low (for example - location and year of construction)
 - b. Medium (location, year of construction, type of heating/cooling system, ventilation)
 - c. **X High (precise information about construction and installation components)**
10. Which of the following output does the tool provide (indicate with X)?
 - **X Energy saving**
 - **X Energy demand**
 - CO2 reduction

- Comfort improvement
- **X Building label**
- **X Money saving**
- **X Renovation cost estimate**
- **X Payback time**
- Other...

11. Does the tool focus on specific renovation work (for example, only insulation, only installations, only windows change, other)?

Not officially, but since it is a tool powered by Bosch, chances are that there is a (hidden) focus on heating systems.

12. Does the tool provide opportunity for calculation of multiple components of the building?

Yes

13. Does the tool give possibility for implementing renewable energy sources?

Yes

14. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers are possible).

Initial, detailed

15. What stages in the customer journey the tool can be applied to?

Stage 1 to 4



Here please specify other relevant issues....

Calculation tool to support renovation – Sanierungskonfigurator

1. Please specify name of the tool?
Sanierungskonfigurator
2. If the tool is accessible through web page please provide the link? If tool is provided in another form then please specify?
<http://www.sanierungskonfigurator.de/start.php>
3. Is tool for free or has to be paid?
Free
4. Is there institution, public body, commercial body that stands behind the tool?
Public body: Federal Ministry for Economy and Energy
5. Is the tool updated regularly? Is it known when was the tool last updated?
No
6. Is the tool mandatory or voluntary?
voluntary
7. Is the tool aimed for professionals, homeowners, banks/funds or other?
Home-owners
8. Does the tool require information about building present energy performance to perform calculation? (for example heating/electricity energy use for last year, qualitative estimate: good, average, poor, other...)
Yes, the more detailed information you provide, the more precise the results. No options of choosing 'unknown' or of estimations like good, average, poor.
9. What level of information about the building must be provided to perform calculation?
 - a. Low (for example - location and year of construction)
 - b. Medium (location, year of construction, type of heating/cooling system, ventilation)
 - c. **X High (precise information about construction and installation components)**
10. Which of the following output does the tool provide (indicate with X)?
 - **X Energy saving**
 - **X Energy demand**
 - CO2 reduction
 - Comfort improvement
 - **X Building label**

- **X Money saving**
- **X Renovation cost estimate**
- **X Payback time**
- Other...

11. Does the tool focus on specific renovation work (for example, only insulation, only installations, only windows change, other)?

No

12. Does the tool provide opportunity for calculation of multiple components of the building?

Yes

13. Does the tool give possibility for implementing renewable energy sources?

Yes

14. What stage of the renovation process is supported: initial, detailed, contracting, execution, post execution? (Multiple answers are possible).

Initial, detailed

15. What stages in the customer journey the tool can be applied to?

Stage 1 to 4



16. Here please specify other relevant issues...

17.