Deliverable 7.3

BC3 Demonstrator

WP 7

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PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	**X**
CO	Confidential, only for members of the consortium (including the Commission Services)	

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Abbreviations

BC	Business Case
CA	Consortium Agreement
i.e.	id est (engl. = that is to say)
IPR	Intellectual Property Rights
RTD	Research and Technological Development
S & T	Scientific and Technological
SME	Small and Medium-sized Enterprise
WP	Work package
w.r.t.	With respect to

1 Executive Summary

This report belongs to the European project NewBEE – Novel Business model generator for Energy Efficiency in construction and retrofitting. The main purpose of the report is to describe the demonstration of the use of NewBEE tools in Finland. The report describes the usability of the tools especially from the point of view of the Finnish partner SMEs of the NewBEE project. The Finnish SME partners are two architect offices and one energy consultant.

The report focuses on three tools: NewBEE Market place, E-PASS and pre-assessment tool.

The market place enables building owners to:

1) Register refurbishment projects publishing a call for proposal from scratch or with the help of the Pre-Assessment tool;
2) Search for service providers;
3) Receive refurbishment offers, i.e. the building owner can see all offers SMEs made according to his/her published business opportunities.

The market place supports SMEs that provide disciplines and services for energy efficiency refurbishment by enabling:

1) Registration in the platform (if not done previously)
2) Business opportunity (refurbishment project) searching,
3) Partner searching to create a joint offer with a team,
4) Sending an offer to the building owner by first creating a team on the published retrofitting project.

The NewBEE platform provides a link to energy performance assessment tool E-PASS. With the help of this tool, the SMEs and advanced owners can assess the potential energy, cost and carbon footprint savings from different refurbishment actions. The user of this tool can assess the energy performance and the saving potential. The saving potential is assessed in terms of: 1) energy consumption (kWh/a), 2) cost (e/a), and 3) GWP (kg CO2e/a).

Owner-user can use the pre-assessment tool to receive a first idea on retrofitting measures and to identify the most appropriate retrofitting technologies based on their requirements. It allows different technical scenarios that might be appropriate to address the building problem at hand. In result different scenarios can be chosen and analyzed by costs and earnings by energy savings.

The NewBEE Market Place tool was demonstrated in organized sessions where the Finnish SMEs used the tool following the corresponding steps of realistic cases. Here two different scenarios were taken into account:

- S1: House manager of housing association makes a business opportunity (consultant);
- S2: Energy consultant or architect searches for business opportunities.

E-PASS tool was demonstrated in two different scenarios:

- S3: The first session was a case study where the Finnish SMEs used the tool to follow the steps of a real situation (Energy consultant or architect uses E-PASS to support a house manager to find rational opportunities for energy refurbishment).
- S4: E-PASS was also demonstrated the use of the tool by arranging a session together with a (real) house manager. FE used the tool together with the client to show how it would work in a real situation where the best options for energy refurbishment are searched for with the help of an assessment tool.

Pre-assessment tool was demonstrated in one scenario:

- S5: Refurbishment in “HakaPaavo”.

2 Introduction

2.1 Document Purpose

This document reports the results of the Finnish demonstration cases. The report belongs to the project NewBEE – Novel Business model generator for Energy Efficiency in construction and retrofitting.

The purpose of the document is to assess the usability of the tools especially from the view point of the Finnish partner SMEs of NewBEE. The Finnish SME partners are two architect offices and one energy consultant.

2.2 Approach Applied

The project plan says that the Finnish Business Case focuses on the development of energy-efficient and sustainable retrofitting processes with the help of three different case studies based on different building types (detached houses, block houses and office buildings). The SMEs involved in this Business Case will put in practice the project concepts and tools and will involve a refurbishment client in the application of the NewBEE platform and Methodology. The measures and solutions will be based on the project scope: the location, use, type, age, structures of the building as well as the client's budget. A close collaboration with research partners and SMEs will be in the centre of this business case. The role of the cases studies will be to provide concrete scenarios where the sustainable retrofitting processes will be developed and tested. The Finnish SMEs (FE, KVA and T-E (former ERI)), with the support of VTT, will describe the Business Case and extract functional requirements, based on previous retrofitting projects experiences, for the specification and development of NewBEE system. The SMEs will test, further develop and implement the new retrofitting processes in three case studies within this Business Case.

The NewBEE Market Place tool was demonstrated in organized sessions where the Finnish SMEs used the tool following the corresponding steps of realistic cases. Here two different scenarios were taken into account:

- S1: House manager of housing association makes a business opportunity (consultant);
- S2: Energy consultant or architect searches for business opportunities.

E-PASS tool was demonstrated in two different scenarios:

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- S4: E-PASS was also demonstrated the use of the tool by arranging a session together with a (real) house manager. FE used the tool together with the client to show how it would work in a real situation where the best options for energy refurbishment are searched for with the help of an assessment tool.

Pre-assessment tool was demonstrated in one scenario:

- S5: Refurbishment in "HakaPaavo".

2.3 Document structure

The document consists of:

- Section 1. Executive Summary with a short and concise overview of the overall content of the whole document, whom is the document, intended to, main results described in it, interest for the reader and benefit the reader may expect from it.
- Section 2. Introduction, which describes the purpose of this document, the position of this document with respect to the whole project, and provides a brief overview of the contents of the document.
- Section 3. Scenarios identified which demonstrate the NewBEE system in Finnish retrofitting sector.

- Section 4 to 8 describes the demonstration cases, explains the work flow in each case and presents the observations and comments about the demonstration.
- Section 9 summarises the results and makes conclusions.

2.4 Objectives

The objective of this deliverable is:

- to present the results of the Finnish demonstration cases;
- to make conclusions of the usability of the Market Place tool, the energy performance assessment tool E-PASS and the pre-assessment tool;
- to describe the potential use of the tools in the business cases of KVA, FE and T-E.

3 Scenarios identified

In the case of Finland there are five scenarios for demonstrating the NewBEE system in a realistic environment:

- S1: House manager of a housing association makes a business opportunity for a consultant.
- S2: Energy consultant or architect searches for a business opportunity.
- S3: Energy consultant or architect uses E-PASS to support a house manager to find rational opportunities for energy refurbishment.
- S4: Energy consultant or architect uses E-PASS to support a house manager to find rational opportunities for energy refurbishment.
- S5: Refurbishment in “HakaPaavo”.

The main actors in the scenarios are the ones specified in the following table:

Table 1 - Scenarios main actors

	OWNER	**SME**
S1	X	
S2		X
S3		X
S4		X
S5	X	

4 S1: House manager of a housing association makes a business opportunity for a consultant

The intended workflow is presented in the following Table 2. Corresponding findings and comments about the usability are presented on the right hand side of the table.

Table 2 - Intended workflow for S1 and corresponding findings during demonstration

STEPS	FINDINGS AND COMMENTS
Before starting to use the tool, the house manager defines the intended need for refurbishment. In this case it was defined that the needed refurbishment is • Façade refurbishment • Plumbing refurbishment • Building extension as an option	
The work starts by checking the options from NewBEE Knowledge Repository (WIKI).	At this stage very little information is available.
The next stage is to open the Owner Section.	The page can be easily found.
The house manager registers or logs in (Figure 1)	The registration works without problems. After the registration, a confirmation is received by e-mail.
The house manager defines the location and the type of the building (Figure 2)	It is good that both the location and type can be defined to contact relevant consultants. At this stage the outline of building types is not usable because all relevant building types are not included in the drop-down list.
The house manager defines the building data	When localising the tool, the outline of building data needs to be carefully defined. It is important that all relevant information can be selected but there should not be too much information. Important information include for example • Facade • Roofing • Load bearing structures • Heating system Information about the availability of drawings is more important that to attach drawings at this stage. The possibility to attach figures of the building is good.
The house manager selects “New business opportunity”	From the view point of the house manager, the case is not a business opportunity but a contact request. It is important to note that at this stage the request is for contacts not for offers, SMEs will not be able to make an offer on the bases of limited information.

The house manger starts to define the observed problems, needed technologies and / services (Figure 3)	The lists that are visible in the Owner Section and in the SME Section do not correspond. It is of utmost importance that the lists are identical. When an SME registers and defines the services and technologies, the list of options needs to be accurately identical to the list with the help of which services are searched.
The house manager defines the deadline for contacts	Deadline for Contact - not Contract

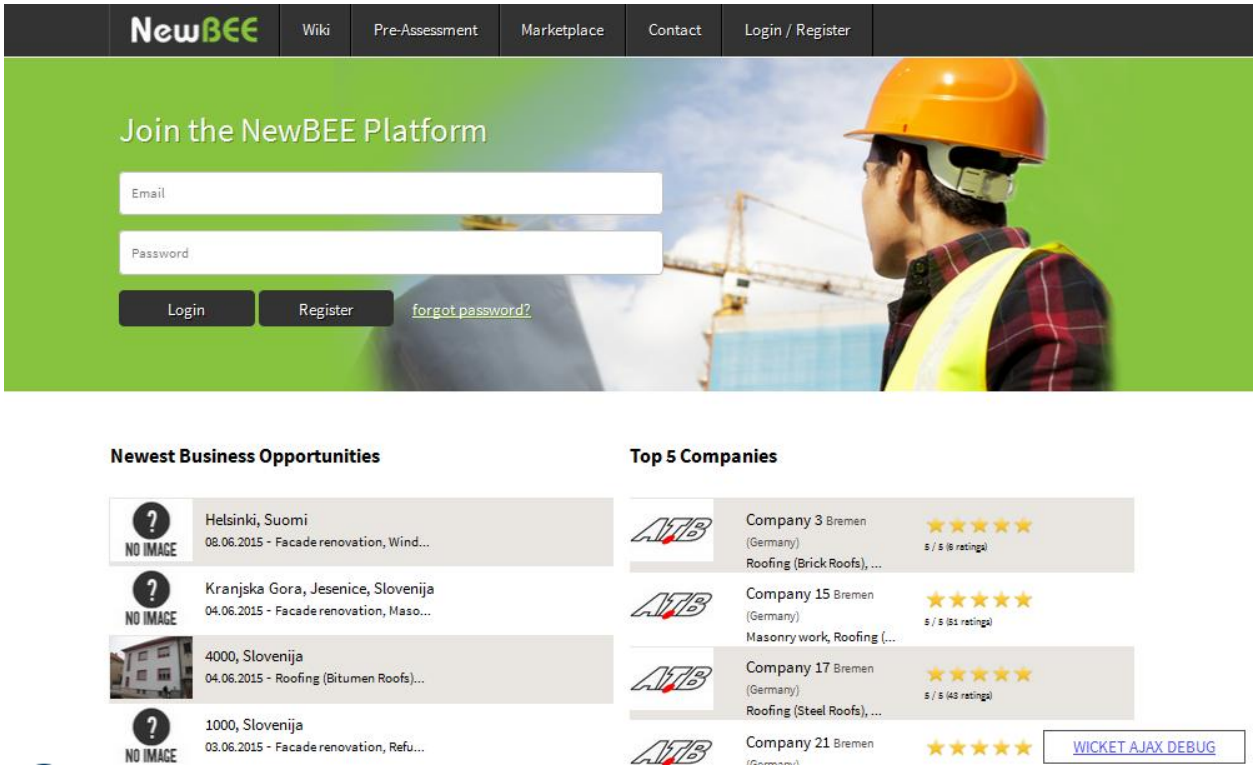


Figure 1 - Registration to the platform

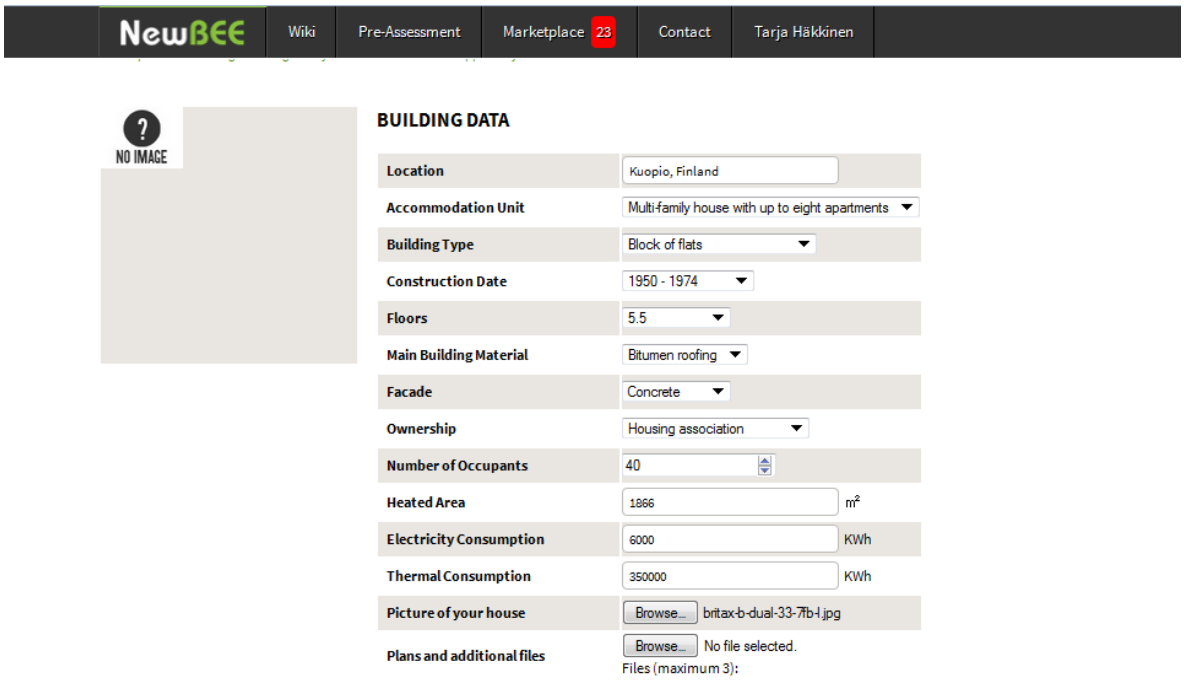


Figure 2 - Defining the building data

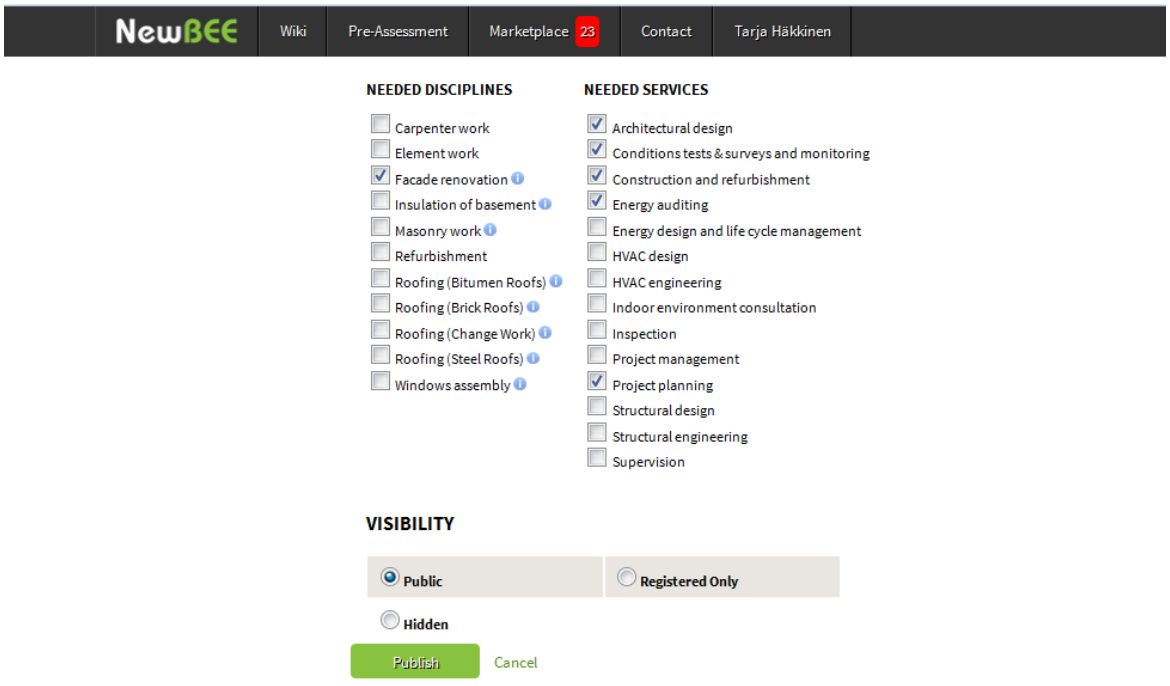


Figure 3 - Defining needed services

5 S2: Energy consultant or architect searches for a business opportunity

The intended workflow is presented in the following Table 3. Corresponding findings and comments about the usability are presented on the right hand side of the table.

Table 3 - Intended workflow for S2 and corresponding findings during demonstration

STEPS	FINDINGS AND COMMENTS
The consultant logs in the Market Place.	
The consultant defines the location and types of buildings. The consultant filters opportunities in Finland by defining services and technologies that he/she is able to offer.	It is extremely important that the outlines of building types, services, disciplines, and technologies are completely identical for both service providers and owners. Only this makes it possible that the portal supports the meeting of owners and service providers.
The consultant filters and searches for opportunities.	
The consultant finds the available opportunities on the basis of the selections.	
The consultant contacts the owners.	
The consultant selects the opportunity that he/she is interested in.	
The consultant starts to make a team on the basis of the owners request to form a team that has all needed competences.	
The consultant searches for possible partners (Figure 4).	The outline of services etc. should be identical for all. It is extremely important that the lists are completely similar.
The system offers potential partners.	The consultant should be able to restrict the search so that not-relevant long-distant partners would not be suggested by the system.
The consultant starts to edit.	At present, the selection of the team takes place in a too straightforward way. • The consultant should be able to change companies. • It should be possible to select team members one by one. In practice the creation of a team is a process where potential partners negotiate and investigate the positive and negative points of collaboration. Because only win-win situations are useful, the Market Place should offer a working area for these contacts. The working area should support the process. The team creation takes place too early. The consultant will not be able to make decisions about

	the needed composition of the team on the basis of the preliminary contact request done by the owner. Before creating a team, the consultant needs to contact the owner and to create a good understanding about the case and needed competences. Only after this, the consultant is able to start to define the needed partner qualifications, search, negotiate and finally create the team. A minimum needed change to the tool is that the team creation is a separate operation. It cannot be embedded to any other function.
Editing one's own profile	The usability of the tool would also improve if the profile could be more easily edited. What happens now if a consultant accidently defines him/her as an owner instead of an SME?

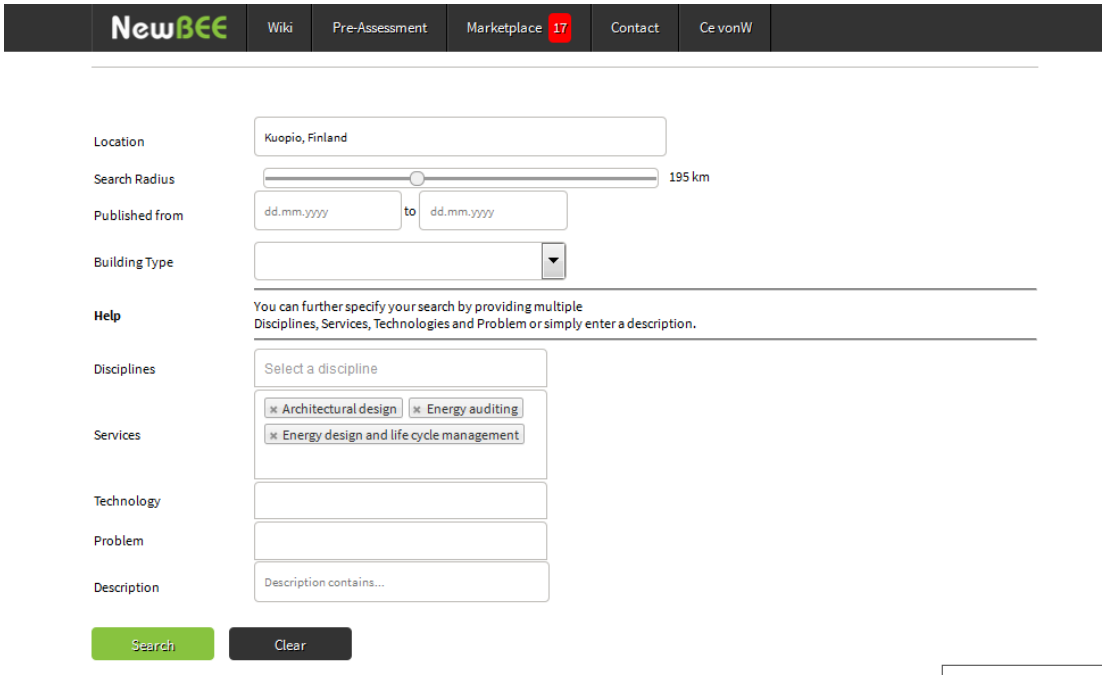


Figure 4 - A consultant searches for partners

6 S3: Energy consultant or architect uses E-PASS to support a house manager to find rational opportunities for energy refurbishment

This scenario was realized so that the Finnish SMEs together played with the tool and tried to follow the steps of a real situation where a consultant uses E-PASS to support a house manager to find rational opportunities for energy refurbishment.

The intended workflow is presented in the following Table 4. Corresponding findings and comments about the usability are presented on the right hand side of the table.

Table 4 - Intended workflow for S3 and corresponding findings during demonstration

STEPS	FINDINGS AND COMMENTS
The consultant goes to the home page and select Go to platform. E-PASS can be found in the end of the page.	E-PASS is not visible for the user who opens the platform. E-PASS is not found on the upper side of the page and not on the page but the user needs to move to the end of the page. E-PASS must be included as one of the titles or on the same space than other tools (Figure 5).
The consultant together with the client defines the building by defining the building location, type etc. (Figure 6) (STEP 1).	
The calculator calculates the start values.	
The consultant asks the type of the energy refurbishment measures already done. The client explains that windows have been changed. The consultant edits the default values by changing new U-values for windows (Figure 7).	Clarifying explanations are needed for the terms Schedule and Appliances / schedule (Figure 8) to enable the user to understand the meaning of the default values and make changes when needed.
The calculator calculates new starting values for the building and the consultant together with the client proceeds to the next step (STEP 2).	
The consultant together with the client starts to define refurbishment options (STEP 3). The calculator calculates new values for energy performance after refurbishment. This step can be repeated by choosing different alternatives and always going back to STEP 3.	It should be possible to save the calculations results for different refurbishment alternatives. This would be useful because it would enable the better comparison between alternatives. In addition to the calculation result also the list of choices should be visible. If new calculations are done for different kinds of alternatives, the comparison is difficult, because saved information about the results is not available. The optimal solutions would be, if information about all calculated alternatives were visible and the user was able to bring the calculation results to an Excel.
The energy performance assessment result is received in STEP 4. The consultant together with the client looks the result and the consultant also asks the client to notice the corresponding savings in greenhouse gases (Figure 9).	It should be possible to use municipal specific data for the calculation of GHG values. Especially public clients at present want to be aware about the saving potentials and thus specific information about district heating and decentralized energy generation should be included as background data and available automatically when the building location is defined.

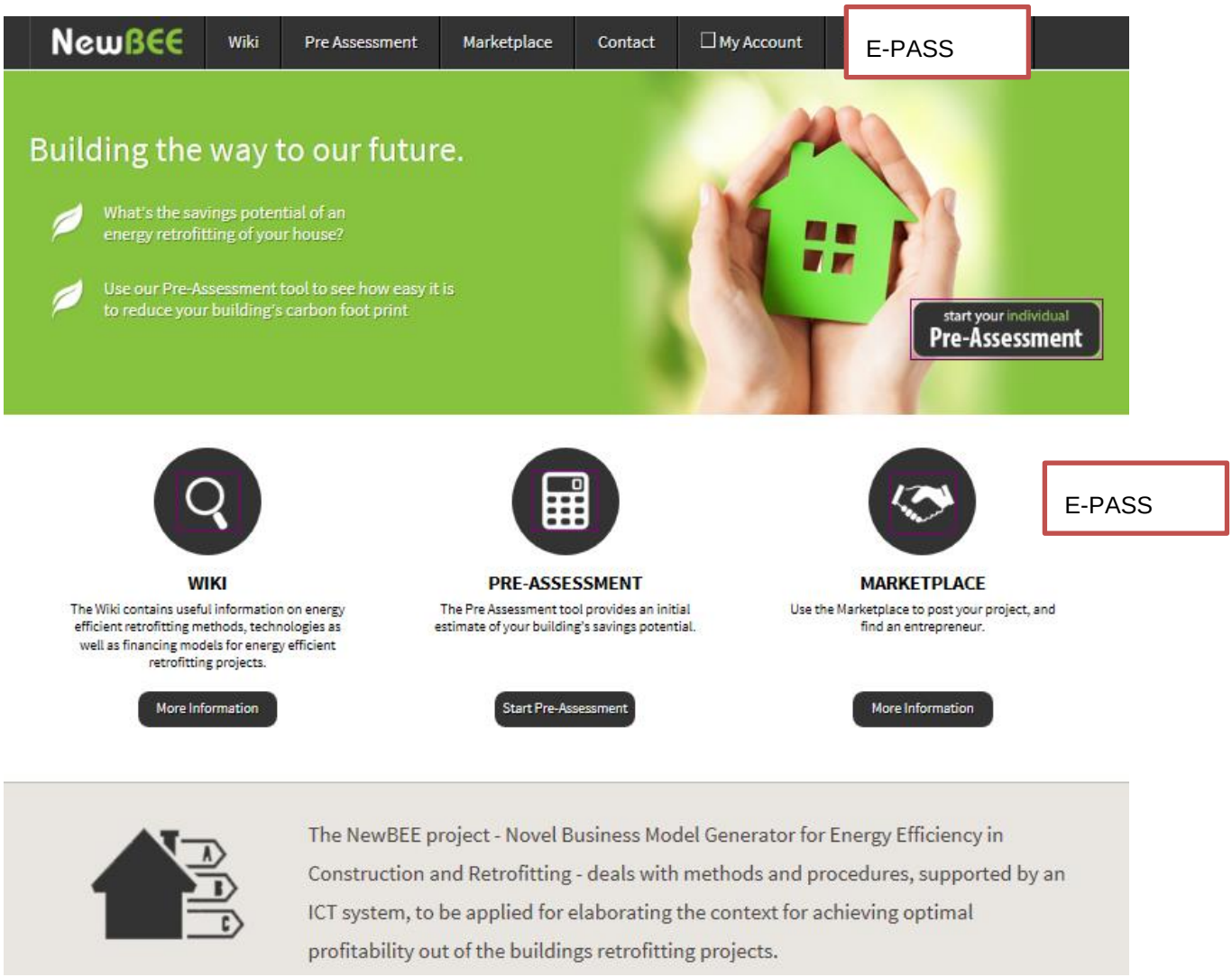


Figure 5 - How to find E-PASS on the NewBEE Platform

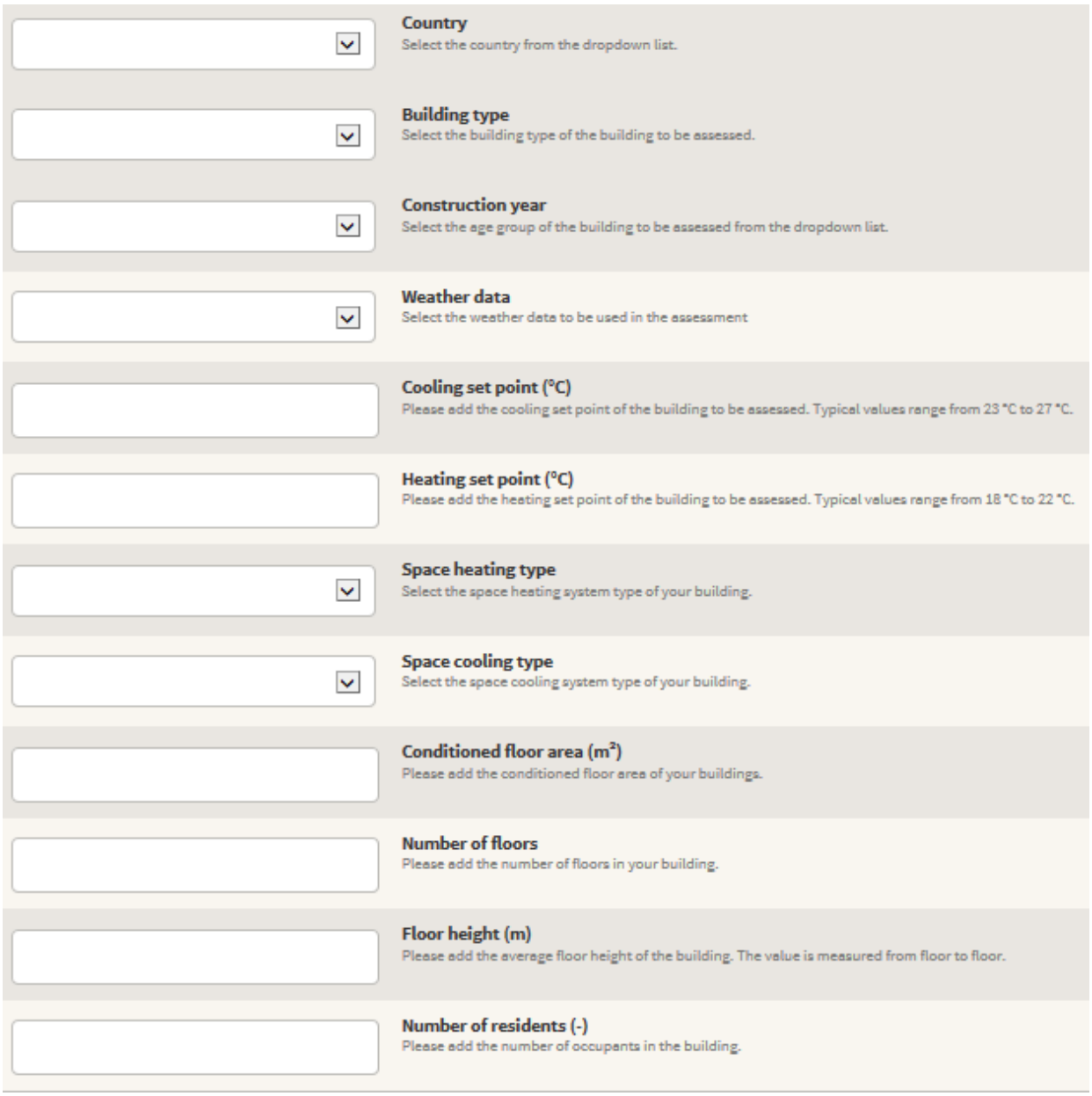


Figure 6 - The consultant defines the building together with the client

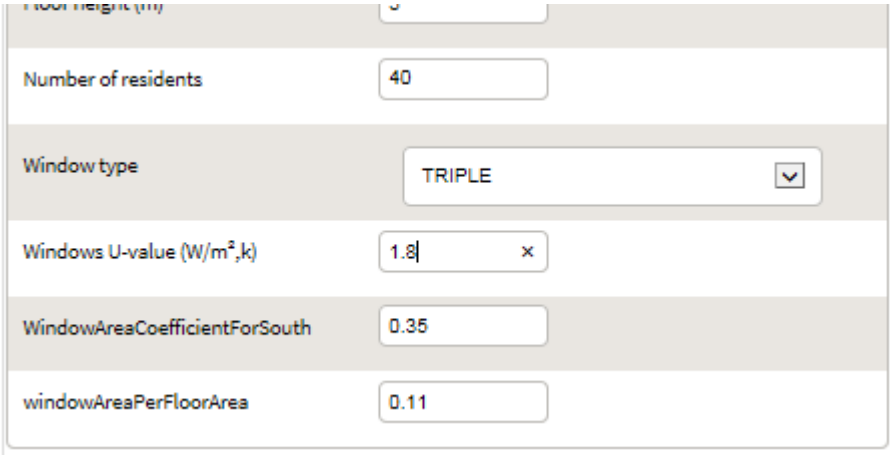


Figure 7 - Editing default values when needed

Occupants (W/m²)	2		
Schedule	**Begin**	**End**	**On factor**
Workdays	0	24	0.6
Saturday	0	24	0.6
Sunday	0	24	0.6
Appliances (W/m²)	4		
Schedule	**Begin**	**End**	**On factor**
Workdays	0	24	0.6
Saturday	0	24	0.6
Sunday	0	24	0.6

Figure 8 - Need for clarifying explanations (for Schedule)

E-PASS RESULTS

Done!
Please find the results of the applied refurbishment measures. The impact is listed by sub-system type and summarized as an impact on the operational costs and CO2-emissions.

	Space heating and hot water		Appliance electricity		Space cooling		Carbon footprint		Energy cost	Investment	Payback time
Case	kWh/a	kWh/m2,a	kWh/a	kWh/m2,a	kWh/a	kWh/m2,a	tCO2/a	kgCO2/m2,a	€/a	k€	a(year)
Before	281560	141	56058	28	0	0	120	0.06	31689	-	-
After	270163	135	56058	28	0	0	116	0.06	30898	18005	22.8
Savings	11397	6	0	0	0	0	4	0	791	-	-

Figure 9 - Looking the calculation result

7 S4: Energy consultant or architect uses E-PASS to support a house manager to find rational opportunities for energy refurbishment

This scenario was realized so that a house manager in Kuopio supported by the FE used the E-PASS tool for an actual building in Kuopio (Figure 10) and followed the steps of a situation where a consultant uses E-PASS to support a house manager to find rational opportunities for energy refurbishment. Three house managers participated in the demonstration (Figure 11).

The intended workflow is presented in the following Table 5. Corresponding findings and comments about the usability are presented on the right hand side of the table.

Figure 10 - The apartment building chosen for the demonstration represents a typical example of Finnish housing from 1970s.

Figure 11 - The house managers and the consultants used E-Pass tool for a real building in Kuopio.

Table 5 - Intended workflow for S4 and corresponding findings during demonstration

STEPS	FINDINGS AND COMMENTS
The consultant goes to the home page and selects Go to platform. E-PASS can be found at the end of the page.	E-PASS is not visible for the user who opens the platform. E-PASS is not found on the upper side of the page and not on the page but the user needs to move to the end of the page. E-PASS must be included as one of the titles or on the same space than other tools (Figure 5).
The house manager together with the consultant defines the building parameters by entering the building location, type etc. (Figure 12 and Figure 13) (STEP 1).	The input in floor area might sometimes to require to be calculated by hand, as in some cases the size is defined in volume, but not at all always. It is relatively easy to find the information required in this step. It is also regarded as a good feature that the input fields are filled with default data once the construction year is selected (Figure 13), and the user just needs to check if they are correct. Especially for the heating and cooling options the tool seems to give correct options right away.
The calculator calculates the start values.	
The house manager together with the consultant compares the calculated consumption values to the ones that are known according to the house manager's certificate for the building in question. (STEP 2)	The calculation gives the result in kWh/m^2,a, while the ones currently shown in the house manager's certificate for the buildings is in kWh/m^3,a. It would be good if both were shown, to facilitate the comparison of the results to the known values. It might be a bit confusing, if the calculation gives very different values. In this case the calculated value (132 kWh/m^2,a) is slightly bigger than the value in the certificate (117 kWh/m^2,a), but the house manager immediately knows the reason, as he knows about the improvements that had been made in the building.
The house manager presses the 'Edit more details' button to make changes to the default values.	
The house manager and consultant together define the type and effect of the energy refurbishment measures already done. The house manager explains that windows have been changed and some insulation has been added to the roof. The house manager edits the default values by changing new U-values for windows, from those typical for 1970s (2.2 W/m^2,K) to those typical in 1990s (1.8 W/m2,K), when the window renovation took place. Changes to the roof insulation are not made. The value for cold water temperature is changed. The house manager presses the 'Save details' button. (Figure 14)	At this point the house manager notes that it would be important to have a choice for mechanical ventilation for 1970s houses. There are input cells for mechanical ventilation system, but it is left unclear if the values are relevant for also exhaust ventilation or only for fully mechanical ventilation with or without heat recovery. At this point one of the house managers asks if the values are different for different types of houses. The consultant explains that the default values presented here depend on the choices made in earlier step (STEP 1), regarding the type and age of the building.
The calculator calculates new starting values for the building and these are again compared to the	The new consumption values are closer to the certificate values (128 kWh/m^2,a vs. 117

values in house manager's certificate for the building in question.	kWh/m^2,a), and it is concluded that the reason for not being closer is probably due to the fact that the value for the roof insulation was not changed in previous step.
The house manager together with the consultant defines refurbishment options for the building (STEP 3). In this case, the choice for extra roof insulation is chosen (Figure 15). The calculator calculates new values for energy performance after refurbishment. This step can be repeated by choosing different alternatives and always going back to STEP 3.	At this point it is discussed how the costs are and should be defined. The costs for different façade options can vary a lot. It is concluded that the costs presented by the tool must be regarded as indicative, average costs. It is also discussed how realistic it is to have 0,1 as new U-value for façade, what it would require as insulation thickness. It is noted that this would probably require extensive construction works. The house managers comment that most of the essential options could be found in this step, and even some extra, not so relevant for apartment buildings. But it seems logical to have these extra choices, as the tool is also intended for use by individual house owners. The only one that seems to be missing was the option for glazing of balconies. This is quite relevant option for Finnish apartment buildings according to the house managers, and may improve the insulation of the façade concerned as much as 15 %. It is well understood and agreed by the house managers that the improvements having very small effects should be omitted in this type of tool.
The energy performance assessment result is received in STEP 4. The house manager together with the consultant looks at the results (Figure 16).	The house managers comment that although the estimated savings give good information for the comparison of different renovation options, it can't be presented to the inhabitants as such. The tool is regarded helpful for initial comparison of different renovation options. The demonstration participants conclude that the tool could be very useful for the planner or consultant for first estimations of the renovation options. The house managers usually contact consultants for comparing renovation options. Usually the need comes from practical reasons, e.g. need for renovating the façade due to aesthetical reasons, and with this tool the house manager and consultant could show the benefits of doing energy efficiency improvements at the same time. It would probably increase the interest for the tool, if it was made available also in Finnish (and other local languages).

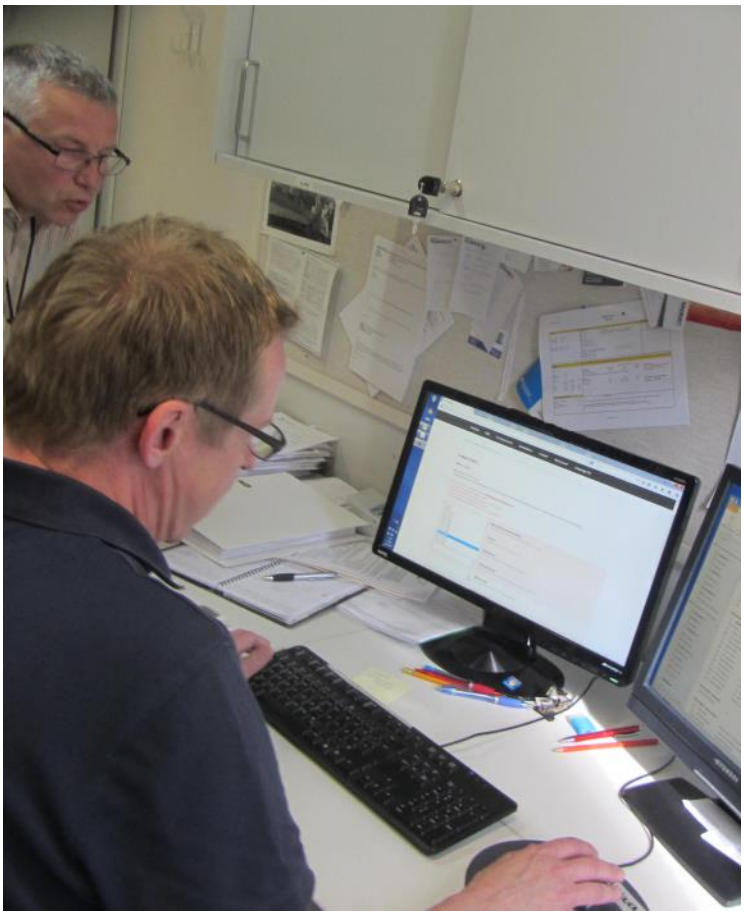


Figure 12 - The house manager chooses the year of construction for the building in question.

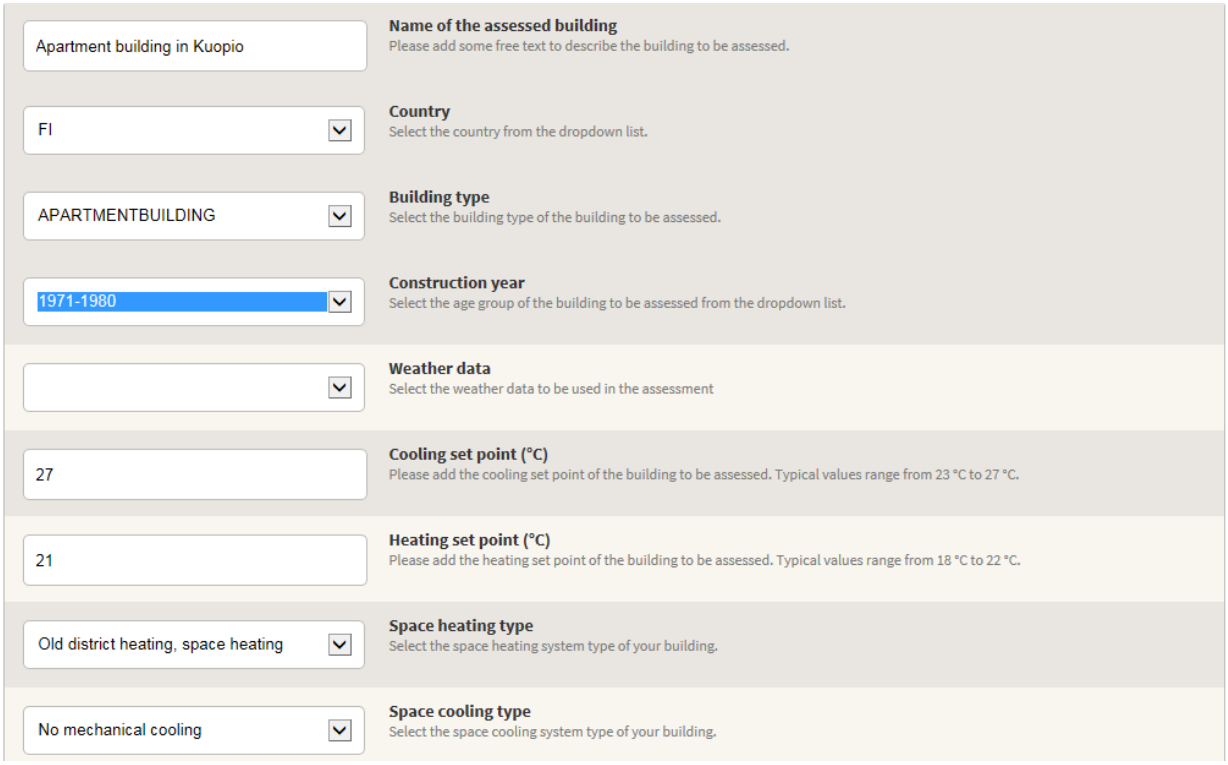


Figure 13 - Once the construction year is selected, the tool gives default values for the rest of the input points (except the weather data), and the user can change them according to needs.

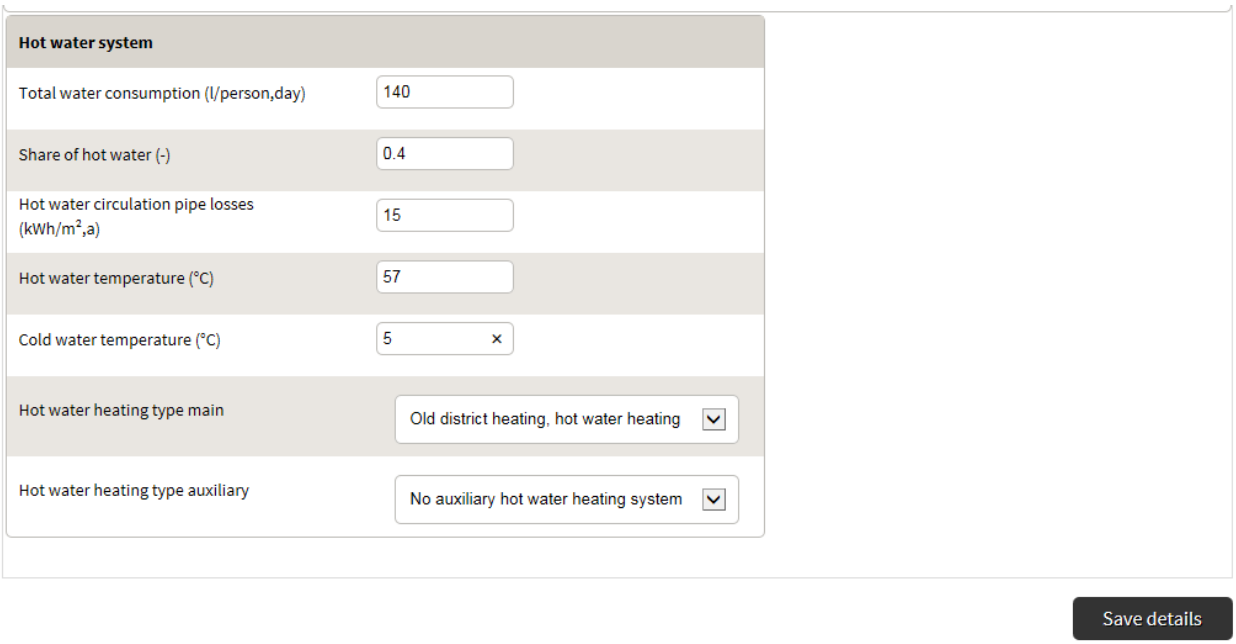


Figure 14 - Viewing, editing and saving the details. Here, the cold water temperature was changed.

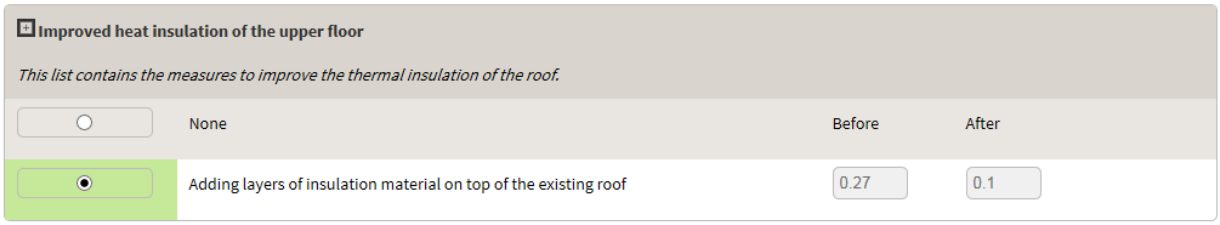
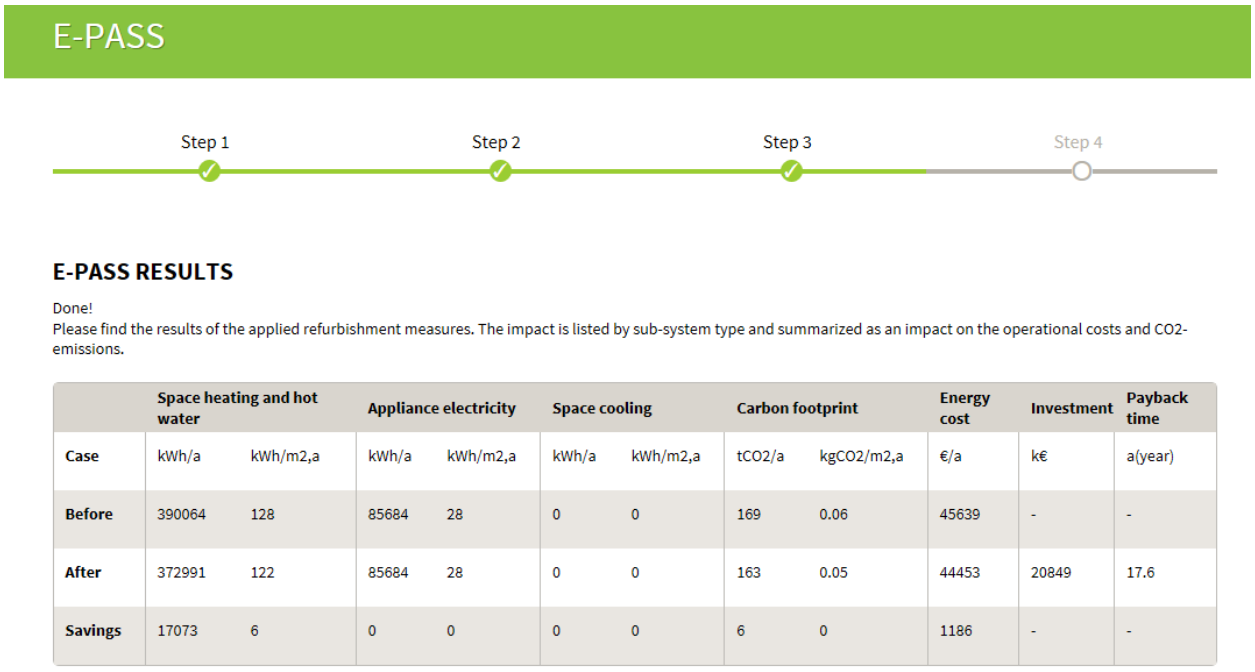


Figure 15 - The refurbishment option selected was improvement of roof insulation.



	Space heating and hot water		Appliance electricity		Space cooling		Carbon footprint		Energy cost	Investment	Payback time
Case	kWh/a	kWh/m2,a	kWh/a	kWh/m2,a	kWh/a	kWh/m2,a	tCO2/a	kgCO2/m2,a	€/a	k€	a(year)
Before	390064	128	85684	28	0	0	169	0.06	45639	-	-
After	372991	122	85684	28	0	0	163	0.05	44453	20849	17.6
Savings	17073	6	0	0	0	0	6	0	1186	-	-

Figure 16 - The results are shown in STEP 4.

8 S5: Refurbishment in “HakaPaavo”

Tengbom Eriksson Architects has used the pre-assessment tool for one of their on-going apartment building refurbishment cases - “HakaPaavo”.

All testing and demonstrations have been carried out with actual building data. Objectives of testing include:

- simulating the use of the NewBEE platform in several ‘what-if’ scenarios;
- testing the validity of the NewBEE results against the actual realized values, using case HakaPaavo as a means to evaluate the platform itself;
- using the NewBEE platform to imagine what could have been the impact of using NewBEE methodology.

8.1 Description

HakaPaavo is a 6-floor apartment building from 1972 in the city of Hyvinkää, Finland.

Hyvinkää has a population of around 46.500 and it is known for being the home of KONE Cranes and Elevators. It is located approximately 50 km north of Helsinki, it has an efficient highway and rail connections allow Hyvinkää to be a commuter area for those working in the capital region.

Figure 17 - HakaPaavo in its present form, as seen from the street.

The frame of HakaPaavo has been constructed of steel-reinforced, 190 mm cast in place concrete slabs, and walls of prefabricated, reinforced concrete elements.

The original windows are double-glazed with wooden frames.

Balconies were also built of concrete elements.

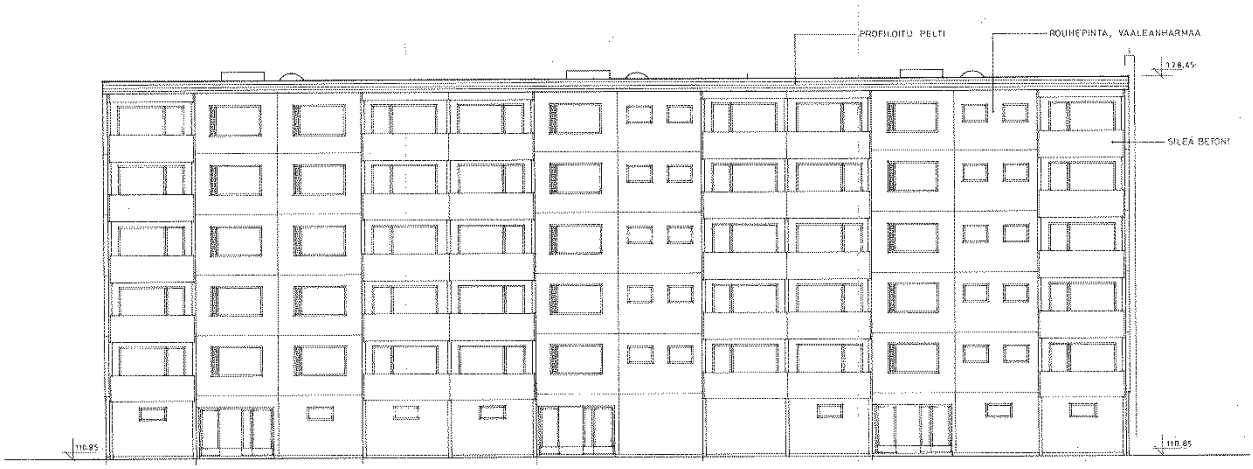


Figure 18 - Original northeast facade.

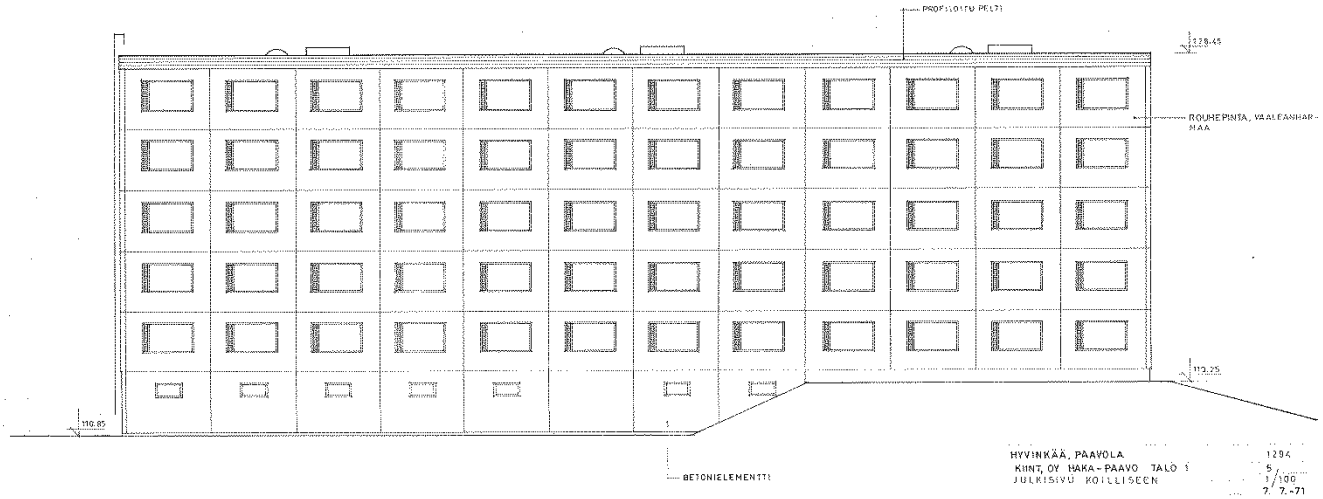


Figure 19 - Original southwest facade.

The original plan of HakaPaavo has 3 internal stairwells (with elevators). The ground floor includes storage, technical, and shared spaces such as sauna facilities. Floors 2 to 6 have 8 apartments per floor.

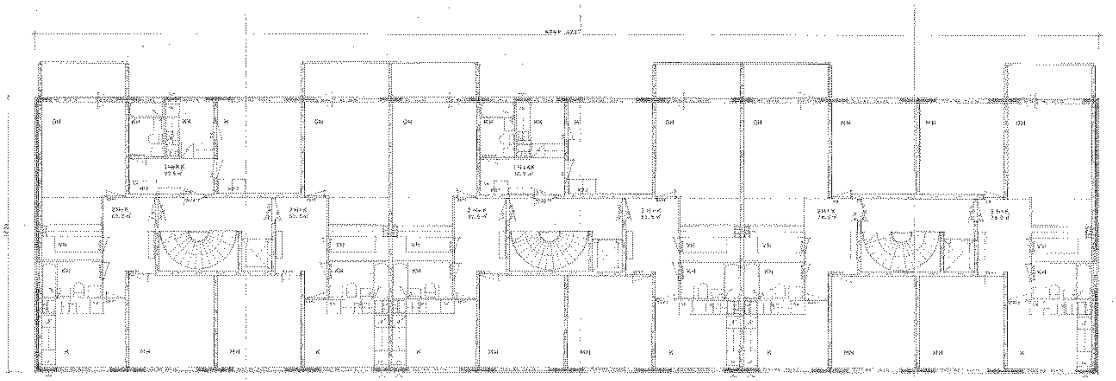


Figure 20 - Original floor plan.

The Refurbishment

In 2013, the Developer (local rental company Hyvinkään Vuokra-asunnot Oy) decided that HakaPaavo will be completely refurbished leaving only the original frame intact. Additional project targets include:

- improving functional comfort of apartments
- improved image, updated facades considering efficiency and maintenance concerns
- additional rental area, more apartments
- improved ventilation and HVAC solution
- energy class: target 100 kWh/m2 (B)

The total area of the project is approximately 3600 brm².

3000 brm² is existing apartment building to undergo a basic refurbishment, 600 brm² will be a newly built extension (1 additional floor of apartments) and approximately 110 brm² supporting yard buildings and new HVAC constructions.

The project assignment was the architectural and principal planning tasks concerning the Finnish Architect's Scope of Work ARK 12, tasks E-K[1] and the Principal Planner's tasks and responsibilities PS012, tasks E-K.

The work has followed the Finnish General Conditions for Consulting KSE 2013.

8.2 HakaPaavo and the NewBEE Pre-assessment Tool

The intended workflow is presented in the following Table. Corresponding findings and comments about the usability are presented on the right hand side of the table.

STEPS	FINDINGS AND COMMENTS
The consultant entered the NewBEE platform at http://www.newbee-wiki.eu/	The platform is for single family houses and has not been adapted for larger properties, such as HakaPaavo. Platform language: English. There will be no Finnish platform.

[1] General planning (yleissuunnittelu), building permit (rakennuslupatehtävät), implementation planning (toteutussuunnittelu), preparations for construction (rakentaminsen valmistelu), construction (rakentaminen), commissioning (käyttöönotto), and warranty period (takuuaika)

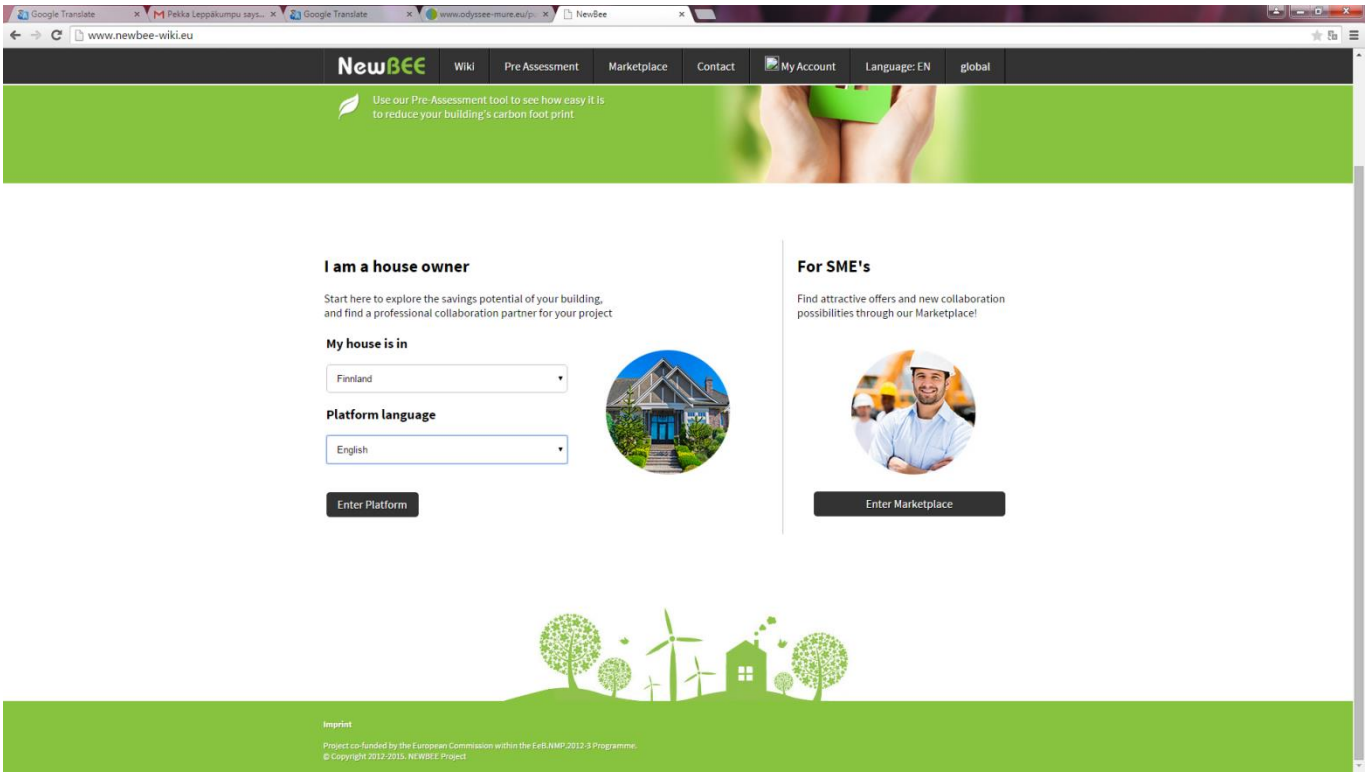


Figure 21 - Pre-assessment tool opening page.

STEPS	FINDINGS AND COMMENTS
The consultant entered the property definition data.	**Year of Building**: 1950 – 1974 is a very large range and includes a variety of construction types. It should be more accurate. **Accommodation Units:** >8 apartments is not adequate, HakaPaavo had 40 apartments before the renovation and will have 64 apartments after the renovation. **Number of Floors:** a max of 5,5 floors is not adequate, HakaPaavo is 6 floors above ground + basement (before renovation), and 7 floors above ground + basement (after renovation) **Thermal Energy:** Due to a lack of exact data, the consultant assumed 7680€ (120€/apartment x 64 apartments).

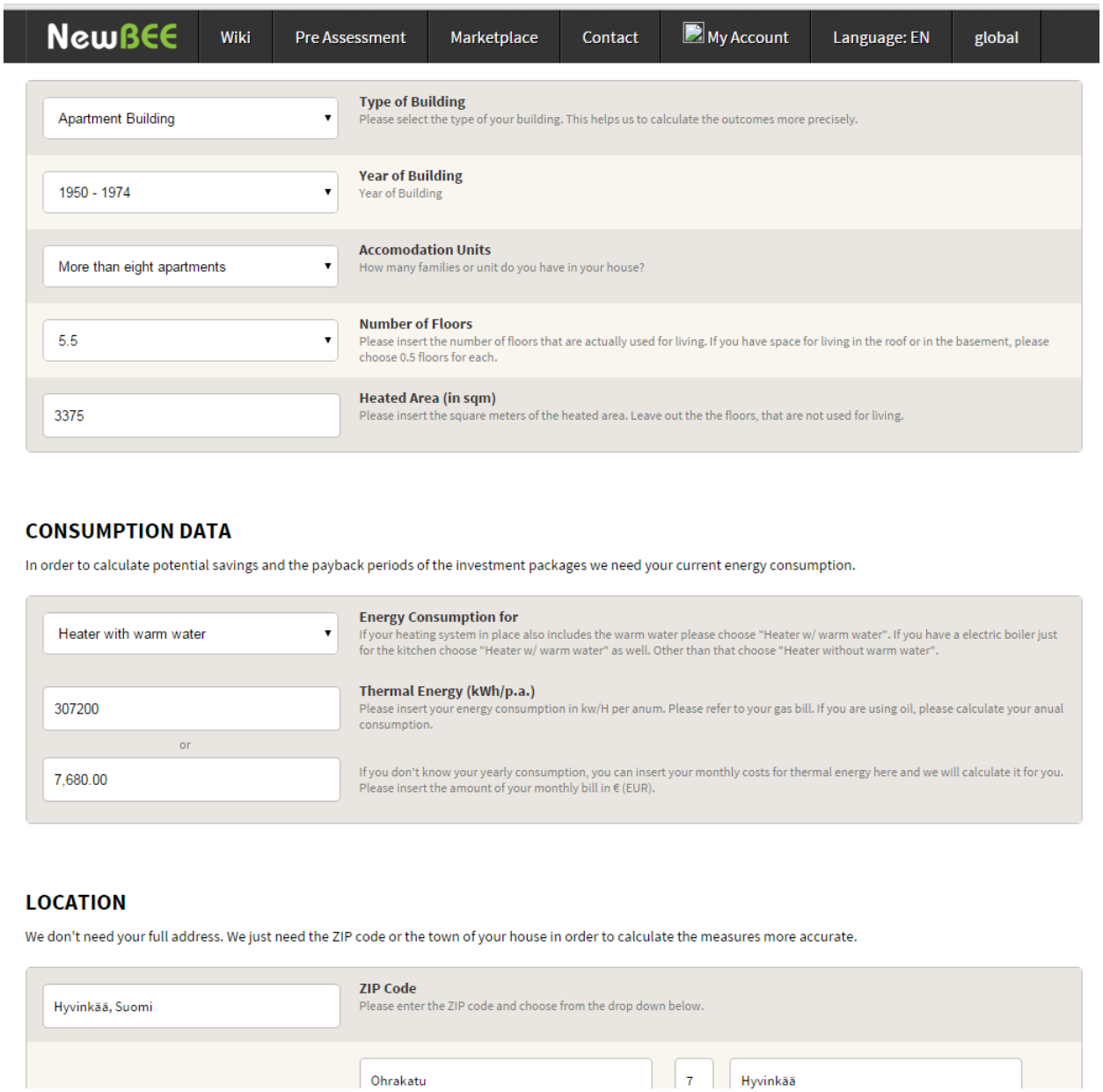


Figure 22 - Definition of property data.

STEPS	FINDINGS AND COMMENTS
The consultant entered three different scenarios/action plans. Scenario 1: 'simple renovation' – roof, basement, windows, electro heat pump including hot water Scenario 2: 'midrange renovation' - roof, walls, basement, boiler with gas Scenario 3: 'total renovation' – roof, walls, basement, windows, boiler with pellets + hot water with solar	In Finland, district heating and heat recovery for the air handling unit are common heating types and they would need to be included in the list in order to be accurate. **Total Investment:** Consultant does not understand what is included here. It is unclear if this 'total investment' only takes into account the material and construction costs for the added insulation.

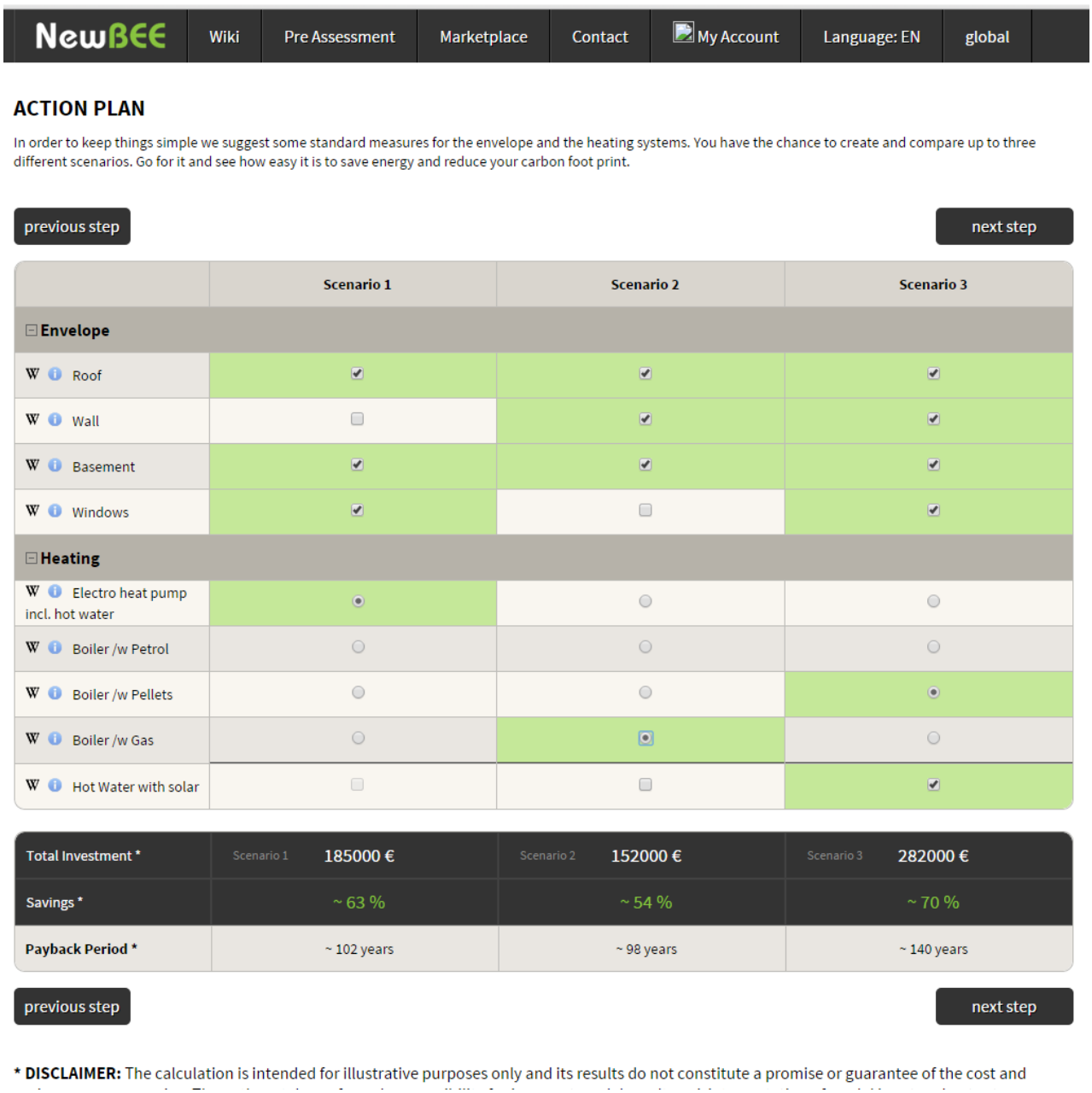
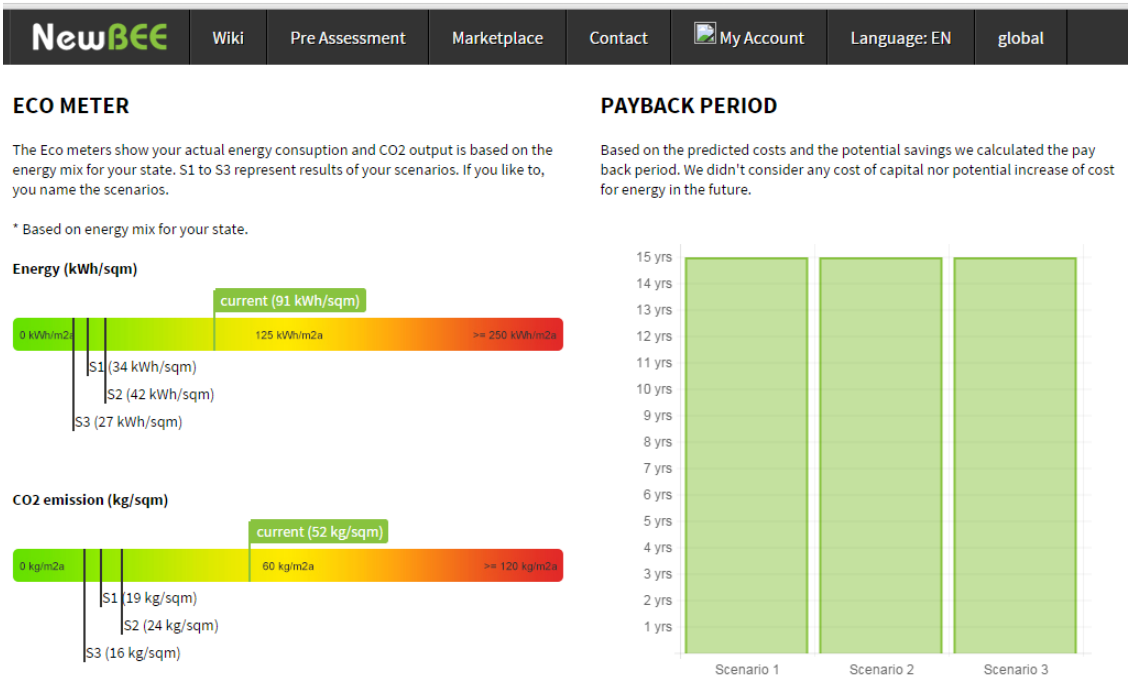


Figure 23 - Definition of scenarios/action plan.

STEPS	FINDINGS AND COMMENTS
The consultant reaches the results page with Eco Meter and Payback Period.	The consultant finds that the Eco Meter results are out of the expected/actual range. NewBEE gives the current (before renovation) total energy consumption for HakaPaavo as 91 kWh/(m^{2}year), this would mean energy class B, which is the energy class the project is aiming for. The expected result would have been 131 – 160 kWh/(m^{2}year), energy class D as the original building is known to be approximately 149 kWh/(m^{2}year), energy class D. The results of the various scenarios seem to be much too low. The results given by NewBEE are:

	• S1 - 34 kWh/m2 • S2 - 42 kWh/m2 • S3 - 27 kWh/m2 (given the property definition data entered, this indeed should be the most energy efficient solution) **Total Investment:** It is unclear what is calculated in the total investment. The actual project investment is ~6 million euros (including construction cost and design/supervision). The consultant does not understand what is included in the sums given. **Payback period:** The consultant is confused as in the previous step, payback periods range from 98 – 140 years, and in this results pages the payback periods are 4 or 5 years. In reality, payback period for the project is estimated at ~40 years. The payback period graph on the top right is confusing as it shows a too short time period (up to 15 years). It is unclear what the payback period graphic is referring to.



Choose your favorite	Scenario 1	Scenario 2	Scenario 3
Measures	**S1** (delete Scenario)	**S2** (delete Scenario)	**S3** (delete Scenario)
Roof	✓	✓	✓
Wall	✗	✓	✓
Basement	✓	✓	✓
Windows	✓	✗	✓
Electro heat pump incl. hot water	✓	✗	✗
Boiler /w Pellets	✗	✗	✓
Boiler /w Gas	✗	✓	✗
Hot Water with solar	✗	✗	✓

Total Investment *	Scenario 1 185000 €	Scenario 2 152000 €	Scenario 3 282000 €
Savings *	~ 63 %	~ 54 %	~ 70 %
Saved KWh / a *	193536 kWh (55602.89 EUR/a)	165888 kWh (47659.62 EUR/a)	215040 kWh (61780.99 EUR/a)
Payback period *	~ 4 years	~ 4 years	~ 5 years

previous step | Save as PDF | Calculate this scenario | Ask for Proposal | Contact Energy Consultant nearby

*** DISCLAIMER:** The calculation is intended for illustrative purposes only and its results do not constitute a promise or guarantee of the cost and savings you may receive. The authors take no formal responsibility for incorrect model results, misinterpretation of model input and output, or actions taken by users based on the results.

Figure 24 - NewBEE Pre-Assessment Tool results page.

8.3 Actual Project Results

Figure 25 - Tengbom Eriksson rendering of HakaPaavo, post refurbishment.

As the HakaPaavo renovation is currently under construction, we can begin evaluating how the actual results compared to the project targets, and to the NewBEE platform results.

- Target: improving functional comfort of apartments.

  Result: approximately the same as before, additional sound insulation added between apartments, interior finishes updated, bathrooms updated.

- Target: improved image, updated facades considering efficiency and maintenance concerns.

  Result: fresh appearance, new roof, windows, and additional insulation for the facades.

- Target: additional rental area, more apartments.

  Result: 50 apartments > 74 apartments (14 new apartments in the additional floor; 10 new apartments as a result of subdividing two larger apartments into 4 smaller ones, floors 2 to 6)

- Target: improved ventilation and HVAC solution.

  Result: new technical systems to meet modern standards.

- Target: energy class target 100 kWh/m2a (B).

  Result: expected result 99 kWh/m2a (B), this will be officially measured after implementation.

In terms of energy, the following modifications were planned:

- *Exterior walls*: additional insulation, facades target U-value 0,17 W/m^{2}K; long facades U-value 0,19 W/m^{2}K
- Windows: new factory made triple glazed wood aluminum windows, minimum U-value 1, 0 m^{2}K
- *Walls of additional floor:* wooden construction, U-value 0,17 W/m^{2}K
- *Basement walls:* U-value 0,51 W/m^{2}K

Figure 26 - Refurbished facades with additional floor.

9 Conclusions

KVA Arkkitehdit, Tengbom-Eriksson and Finnenergia together with VTT demonstrated the use of the NewBEE Market Place, E-PASS and pre-assessment tools in different test case scenarios.

The NewBEE Market Place tool was demonstrated in two different scenarios:

- S1: House manager of housing association makes a business opportunity (consultant);
- S2: Energy consultant or architect searches for business opportunities.

E-PASS tool was demonstrated in two different scenarios:

- S3: The first session was a case study where the Finnish SMEs used the tool to follow the steps of a real situation (Energy consultant or architect uses E-PASS to support a house manager to find rational opportunities for energy refurbishment).
- S4: E-PASS was also demonstrated the use of the tool by arranging a session together with a (real) house manager. FE used the tool together with the client to show how it would work in a real situation where the best options for energy refurbishment are searched for with the help of an assessment tool.

Pre-assessment tool was demonstrated in one scenario:

- S5: Refurbishment in “HakaPaavo”.

On the basis of the demonstration, NewBEE tools are useful and may support the work of SMEs in energy refurbishment markets. NewBEE platform and Market Place tool may find its place as a portal that supports owners to find potential SMEs for energy refurbishment and SMEs to find partners in order to realize different kinds of refurbishment projects.

However, NewBEE Market Place still needs careful localization to be useful. The most important drawbacks that clearly turned out during the demonstration were as follows:

- To give best support for the owners to find service providers and SMEs to find refurbishment projects (business opportunities), the drop-down lists need to be identical for owners and service providers. When the owner defines the disciplines, service and technologies, he/she must use accurately identical lists (outlines) for these disciplines, services and technologies as the SME uses when he/she defines what kind of services is he able to provide.
- All relevant building types need to be included in the lists.
- The possibility for team creation with the help of the platform and Market place tool is a useful function. However, at present, the team creation takes place in a phase that is too early. Possible team creation does not take place after responding to the contact request but it will be done later when the SME already knows what kind of refurbishment. The initial list of needed services that is done by the owner may not be realistic but the SME needs to make the first contacts with the owner to understand the real need for different kinds of competences.

The E-PASS tool is a well-structured tool and it provides relevant refurbishment alternatives. The tool can be used in a simple way for pre-assessment without the user looking and fine-tuning the default values. On the other hand, the tool also enables more accurate calculations by offering an opportunity to specify the default values so that those better characterise the case.

The tool is also useful because - at least in Finland – similar tools specifically designed for comparing refurbishment options are not in the market. There are a big number of energy performance assessment tools. However, in addition to the energy performance calculation engine, E-PASS also provides quite extensive information about the building stock and alternative refurbishment methods. In addition, E-PASS calculates not only energy but also environmental impacts and operational cost savings. This combination makes the tool different compared to the many other energy performance assessment tools in the market.

During the demonstration session, attention was – however – paid on the fact that some improvements would be really useful to ease the comparison of different refurbishment methods:

- If new calculations are done for different kinds of alternatives, the comparison is difficult, because saved information about the results is not available. The optimal solutions would be, if information about all calculated alternatives were visible and the user was able to bring the calculation results to an Excel.
- It would be useful if the energy consumption would be presented both as volume based and as area based. It can be of course easily calculated by the user, but it would facilitate comparison at a glance.
- It would be important to have mechanical ventilation choices for buildings from 1970s.
- It would be good to have glazing of balconies as a renovation choice, as it is becoming more and more relevant at least for Finnish cases.
- It would increase the interest for the tool and usability, if it was made available in Finnish (and other local languages).
- Most importantly, the E-PASS tool should be made more visible on the NewBEE platform, in the similar way as the other tools are now presented.

Also, NewBEE pre-assessment tool still needs careful localization for the Finnish market to be useful. The most important drawbacks identified during the demonstration were as follows:

- The NewBEE pre-assessment tool platform is not yet fully localized for Finland and because of that the results provided were not much reliable. We need to improve the parametrization of the tool for multi-storey apartment buildings with generally more than 5 floors, as in HakaPaavo.
- Major inconsistencies in terms of building typology and pricing, as well as insufficient categories for comparison (such as heating type not including district heating, offering a maximum of 5.5 floors) are key indications of why the results achieved in this demonstration are so skewed. It reinforce the conclusion that improvements on the parametrization of the pre-assessment tool for the Finnish market are needed.
- The NewBEE platform at this stage seems to be more suitable for single family homes, and the demonstrated results for single family homes are more realistic