Deliverable D4.4

NewBEE Methodology

WP 4

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Abbreviations

BC	Business Case
BO	Business Opportunity
BM	Business Model
CA	Consortium Agreement
CWE	Collaborative Working Environment
DFS	Detailed Facility Study
ECM	Energy Conservation Measures
e.g.	Example gratia
EES	Energy Efficient Services
ESCO	Energy Service Company
ESPC	Energy Service Performance Contracting
HVAC	Heating, ventilating and air conditioning
i.e.	id est (engl. = that is to say)
ICT	Information and Communication Technology
IPR	Intellectual Property Rights
IRR	Internal Rate of return
KM	Knowledge Management
LCA	Life Cycle Assessment
LCC	Life Cycle Cost
M&V	Measurement and Verification
MVP	Measurement and Verification Plan
NSS	Network Setup Services
ROI	Return On Investment
RTD	Research and Technological Development
S & T	Scientific and Technological
SME	Small and Medium-sized Enterprise
VBE	Virtual Breeding Environment
VCN	Virtual Collaborative Network
VCWE	Virtual Collaborative Working Environment
WP	Work package
w.r.t.	With respect to

1 Executive Summary

NewBEE project deals with identification of optimal Business Models for the energy-efficient buildings retrofitting. This deliverable provides the Methodology to be followed in the process of identifying these business models. The deliverable also includes a general description of the methods and procedures, as well as their mapping to the conceptual functionalities of the NewBEE ICT platform.

NewBEE methodology attempts at improving support to the construction companies participating in the process, particularly SMEs, from identifying a business opportunity over selecting the most appropriate combination organisational model/financial model for the identification of the most profitable business model in a specific context.

Methodology provides also support to the potential clients/end users of the retrofitting projects, in particular building owners, in terms of offering information on different applicable technologies and available financing sources.

The NewBEE methodology is organised in the following methodological blocks.

Collaborative Working Environment Specification

An important assumption of the NewBEE approach is the decision of companies, particularly SMEs, to complete missing resources by joining associations with complementing partners. In order to facilitate collaboration, the NewBEE methodology provides basic facts about such environments, so-called Collaborative Working Environments (CWE).

Two forms of the virtual CWE, Virtual Breeding Environments (VBE) and Virtual Collaborative Networks (VCN) are described including description of the supporting ICT services for establishing these virtual collaborative environments, the Network Setup Services (NSS).

Identification of a Business Opportunity (BO) and creation of the associated collaborative network

From the point of view of a company active in the buildings construction and/or retrofitting/refurbishment, a business opportunity can be defined as calls for tenders coming from building owners, which can be published using the NewBEE platform advertisement functionality. The rough estimation of the own resources, selection of the (potential) partners possessing the missing resources from the NewBEE VBE and the procedure for creating a corresponding VCN are described. The methodology identifies all the information needed to evaluate a Business Opportunity and to potentially convert it into a collaborative project, including e.g. information about:

- Methods/procedures for identification of the BO appropriateness, such as by assessment of the needed technologies satisfying the owner requirements, needed resources and profitability
- Processes for setting-up the virtual collaborative network to best answer the BO.

Identification of a framework for Energy Performance based Business Model

Once the BO is identified and the Business network answering to that opportunity is created, the SMEs will have to analyse precisely the parameters which define business models for energy-efficient buildings retrofitting. These parameters include:

- Financial models (performance based contract),
- Organisational models – possible adaptation of initially selected ones,
- Roles in a construction / retrofitting processes (stages) according to the specifics of the project (energy performance – current and “to be achieved”, optimal retrofitting technology) etc.

Application of the Energy Efficient Services (EES)

In this chapter the Methodology identifies the information needed to describe the Energy Efficient Services, seen as services for supporting each of the processes of the work performed within the

collaborative network, where the detailed cost / benefit balance is to be calculated for each of the selected retrofitting technology, i.e. energy saving potential versus the retrofitting costs.

Collaborative Knowledge Management

The methodology comprises description of the Knowledge Management in the NewBEE system taking into account its main characteristic – that it occurs in a collaborative environment. The ways for acquiring, structuring and storing specific information in the Collaborative Working Environment, to process it into knowledge, facilitating later reuse in other methodological blocks are hereby being described in more detail.

2 Introduction

2.1 Document Purpose

The purpose of this document is to provide guidelines enabling SMEs from the construction industry to identify optimal business models for energy-efficient buildings retrofitting, by creating collaborative networks.

NewBEE methodology comprises organizational guidelines on how to shift to the New Virtual Network oriented working paradigm and addresses a high level overview of the processes involved in the operation of the NewBEE platform, such as, how to join NewBEE retrofitting virtual community: how Building owners or retrofitting SMEs can generate business opportunities and an associated collaborative network comprising of appropriate SME partners: how to select best retrofitting technologies according to the building typology and other constraints and how to deploy business models constrained by available financial schemas.

Throughout this document, the five blocks of the NewBEE methodology will be described.

2.2 Approach Applied

This document gives a short introduction of the five blocks that compose the NewBEE methodology followed by detailed analysis of each of these five blocks.

The Methodology described in this document, is very much related to the Overall NewBEE Concept described in D3.3, it is based on D3.1 Methodology Specification and inputs from T4.3 Performance based business models.

The methodology takes into account the results of the information obtained in the WP1, WP2 and WP4 and creates the guidelines or roadmap the user has to follow to use properly this information in the way he can turn a Business Opportunity into a real collaborative retrofitting project.

The methodology (together with the NewBEE Concept and specification) will serve to the WP5 developers to implement the NewBEE platform that responds to the user requirements.

2.3 Document structure

The document consists of:

- Section 1. Executive Summary gives a short and concise overview of the overall content of the whole document.
- Section 2. Introduction, describing the purpose of this document, the position of this document with respect to the whole project whilst providing a brief overview of its contents.
- Section 3. Gives a short introduction to the five methodological blocks that compose the NewBEE methodology.
- Section 4. Describes the first block of the NewBEE methodology; how to create the Virtual Collaborative Working Environment allowing NewBEE members to collaborate upon the identification of a Business Opportunity (BO).
- Section 5. Describes the second block of the NewBEE methodology; how to identify a BO based on the advertisement published in the Market Place by the building owners and the steps to be followed to answer to this BO.
- Section 6. Describes the third block of the NewBEE methodology; it details the Energy Efficient Services; seen as services where the detailed cost and energy saving potential for each retrofitting technology is calculated.
- Section 7. Describes the forth block of the NewBEE methodology; it supports SMEs to identify business models (organizational models and financial models) for SME collaboration in the construction sector.
- Section 8. Describes the fifth block of the NewBEE methodology; it details the Collaborative Knowledge Management needed in NewBEE system; the ways for acquiring, structuring and

storing specific information in the Collaborative Working Environment, to process it into knowledge, facilitating later reuse.

- Section 9. Organisational / Human issues in a Virtual Breeding Environment covering the organisational part of the system. This chapter about the methodology explains how to organise collaboration among actors in the Building sector within the VBE in order to assure optimal business models for energy retrofitting projects.
- Section 10. Conclusions and wrap up as deemed necessary.

3 The NewBEE Methodology

NewBEE methodology attempts at improving support to the construction companies participating in the process, particularly SMEs, from identifying a business opportunity over selecting the most appropriate combination organisational model/financial model for the identification of the most profitable business model in a specific context.

NewBEE Methodology proposes a radically new organizational model for enabling the cohesion and efficient collaboration of the whole construction / retrofitting value chain stakeholders. Bearing in mind the different kinds of actors involved in construction/retrofitting projects, the wide range of new technologies available, the different financial schemas, building typologies and regional legislation issues, there exist a number of challenging tasks asking for the early and intensive involvement of all relevant actors. To this extent, appropriate network models which are easily applied for construction SMEs have been identified taking into account the complexities of the above-mentioned issues. NewBEE methodology has been applied to business networks of value chain stakeholders working on construction/retrofitting of buildings aiming at achieving energy efficient solutions boosting the transformation towards low carbon buildings, districts and cities.

It describes models of innovative networks applicable for collaboration in this specific sector and methods and services for the setting up and management of these networks, as well as methods for collection, structuring, saving and reusing of specific knowledge necessary for the operation of such networks.

The main beneficiaries of the NewBEE methodology are retrofitting SMEs, which will introduce the NewBEE platform in their day-to-day work, as well as RTD, ESCOs and other stakeholders involved in retrofitting activities. Therefore the methodology helps these practitioners understand the NewBEE system approach that is based on the potentiality of creating energy performance-based businesses. In addition it is the basic framework for fostering future experiences and tapping potential application in other industrial sectors.

In order to have a successful experience with the four NewBEE business case studies, a methodology needs to be introduced. This methodology has to be easily understood and followed in order to ensure the correct use of the NewBEE platform and future suitability through continuous improvement. Consequently, each of the four business cases studies shall follow the five blocks the methodology is made of detailed and explained in the next chapters.

The NewBEE methodology structure can be summarized as presented in the following figure that depicts its main blocks.

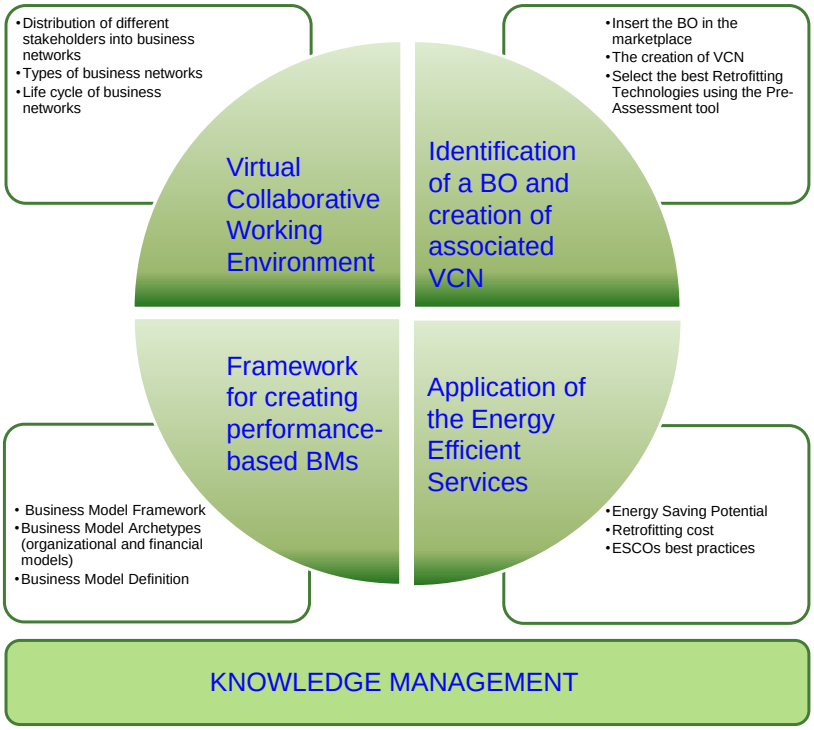


Figure 3-1 – The methodological blocks of the NewBEE methodology

Innovative network models as Virtual Collaborative Working Environment (VCWE)

The aim of the NewBEE Virtual Collaborative Working Environment (VCWE) is to identify and create new performance-based business opportunities for energy-efficient buildings retrofitting. The methodology identifies the kind of information needed for the creation and use of this VCWE networks, i.e. the Network Setup and Management Services of those networks.

The NewBEE methodology provides general description of the VCWE including the basic forms of Virtual Breeding Environment (VBE) and Virtual Collaborative Networks (VCN). Once specified the VCWE, the NewBEE members are able to collaborate upon the identification of a Business Opportunity.

Identification of a Business Opportunity (BO) and creation of the associated virtual collaborative network

After the description of the NewBEE VCWE needed for collaboration, the methodology describes how to identify a Business Opportunity (BO) based on the calls for proposals coming from the building owners (private or public) and the steps to be followed in order to answer to that BO identified.

The methodology identifies all the information needed to convert a BO into a real collaborative project:

- Methods/procedures for rough assessment of the BO appropriateness in terms of its feasibility and appropriate ways of the project realisation under the optimal conditions for both customer and executing SME
- How to insert the identified BO into the NewBEE platform
- How to select the partners for missing resources and how to set-up and manage the Virtual Collaborate Network to best answer the BO.

Application of the Energy Efficient Services (EES)

The Methodology copes with the use of EES in this methodological block.

The Methodology identifies the information needed to describe the Energy Efficient Services, seen as services for supporting each of the processes (stages) of the work performed within the collaborative network, where the detailed cost / benefit balance will be calculated for each of the selected retrofitting technology, i.e. energy saving potential versus the retrofitting costs.

Identification of a framework for creating performance-based Business Models for energy-efficient buildings retrofitting

The NewBEE Methodology describes all the components of a Business Model (BM) based on the Osterwalder's approach and map these components to the specific NewBEE context. The methods and procedures for identifying the most appropriate BM have been described as well:

- Selection of financial models (performance based contract), organisational models, definition of roles for retrofitting, construction / retrofitting processes (stages) according to the building typology, assignment partners to roles.
- Marketing Strategies from the point of view of their importance for energy-efficient buildings retrofitting and for the actors in the retrofitting projects.

Collaborative Knowledge Management

The methodology comprises description of the Knowledge Management in the NewBEE system taking into account its main characteristic, i.e. it should take place in the collaborative environment. The ways for acquiring, adding, structuring, editing and storing specific information in the Collaborative Working Environment, to process it into knowledge, facilitating later reuse in the other methodological blocks are described in detail.

The Collaborative Knowledge Management provides support to users in finding optimal solution for different restoration cases applying Decision Support Systems.

The collaborative Knowledge management methodological block is described as a separate block, and not as a part of the Collaborative Working Environment since it has also a close relation with the rest of the blocks, providing them with the information required.

Furthermore, the methodology explains the energy savings performance contract (ESPC) model implemented by an energy service company (ESCO).

4 Virtual Collaborative Working Environment Specifications

Virtual Collaborative Working Environment is described as groups of entities (legal and/or physical) coming together to cooperate in achieving some shared business goal enabled by various forms of web based technologies.

To enter a project which exceeds their available resources (expertise, workforce and equipment related) companies need to form appropriate alliances. The NewBEE approach envisages the form of the alliances named Virtual Collaborative Working Environment (VCWE).

The most important characteristics of this VCWE are:

- The alliances are of a temporary nature
- The partners are acting as third parties in one entity, while keeping own independence
- The partners are cooperating together to achieve a common objective
- The ICT infrastructure used in the common project is highly integrated

The first step will be initiated by the practitioners (RTDs and Industrial Community) to set up and maintain the Virtual Collaborative Working Environment where general information about building typologies, retrofitting technologies, directives, local regulations, financial schemes and sectorial recommendations can become shareable among the different organization members, and where business opportunities can be identified and can become a shared business opportunity by implementing new performance-based business models. The methodology explains how to join NewBEE retrofitting community in order to identify these new business opportunities.

The aim of the Virtual Collaborative Working Environment is to turn a Business Opportunity (BO) into a **shared** business venture, business shared among the SMEs participating in the collaborative network. The collaborative Environment will capture, share and manage the retrofitting knowledge needed to launch a new energy performance-based business that implies necessary a new organizational model.

4.1 Business Network Concept

As it was defined in *D2.2 Existing methodologies, ICT tool analysis*, a network refers to a structure of interconnected elements. These elements can be people or things and the connections represent relationships between the elements. When network elements are people we are referring to social networks. Social networks are represented as a structure or an interlocking system of social ties among actors, individuals or organizations and in general these networks are initiated and maintained by people.

In the professional field, people belong to organizations or institutions and in this field networks are also defined. An inter-institutional network is understood to be a specific cooperation between several organizations designed to cover a longer period of time for the attainment of jointly stipulated objectives and added value for the individual participants[1].

Networks of people and institutions are made up to pursue one or more objectives or purposes. The main purpose of the networks should be one of the following:

- Exchange of information/knowledge
- Communication between members
- Collaboration in a common goal or project
- Search for allies/partners
- Ask questions
- Get answers
- Explore synergies
- Offer services
- Find suppliers
- Establish business contacts
- Find experts

[1] Wohlfart, U. (2002): Zur Geschichte interorganisatorischer Netzwerke. In: DIE Zeitschrift für Erwachsenenbildung, H. 1, S. 39

4.2 Types of Virtual Business Networks in NewBEE

In the NewBEE collaborative working environment two types of networks are identified:

- Virtual Breeding Environment (VBE)
- Virtual Collaborative Network (VCN)

The hub network, the Virtual Breeding Environment (VBE), involves and comprises the NewBEE practitioners RTDs and Industrial organizations active in the construction industry domain, such as contractors, owners or tenants, suppliers, clients, public administrations, ESCOs, SMEs partners, etc.

Based on the tracking and identification of business opportunities, the VBE infrastructure allows for creation of particular organizational alliances. These alliances created when answering the identified opportunities are called Virtual Collaborative Networks (VCN).

The VCN structures to be considered in NewBEE can be process oriented, project oriented or formed around a main contractor as presented in the *Figure 4-1*.

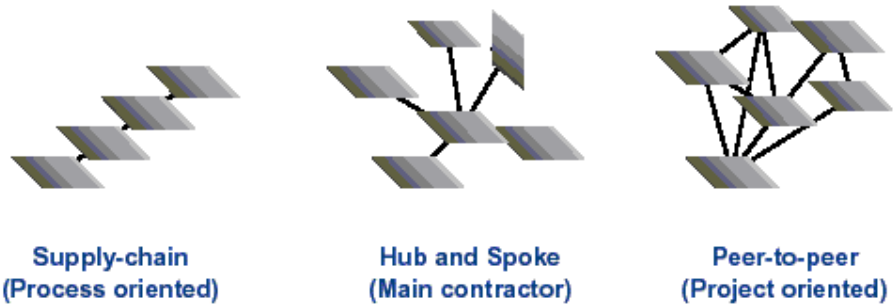


Figure 4-1 VCN Types

The process of surveillance and identification of these opportunities involves the use of the knowledge stored in the NewBEE Database that contains information on building typologies, retrofitting technologies, financial schemes, organizational models, and also will make use of social network analysis techniques through the content allocated in the VBE network.

A Virtual Collaborative Network represents a specific temporary goal-oriented network aimed at the optimization and improvement of key business in the energy retrofitting sector. The managers of these networks are able to enroll stakeholders, who can contribute with their insight to identify the best available business model. Reciprocally, stakeholders interested in participating in a network are able to request to join it. The VCN involves real collaboration among the members, while the VBE implies only cooperation among members.

4.3 Comparison between Virtual Breeding Environment and Virtual Collaborative Networks

The following tables (*Table 4-1*,

Table 4-2 and

Table 4-3) present the relational, functional and structural characteristics that define the two types of NewBEE networks, i.e. VBE and VCN.

Table 4-1. Relational characteristics of a network

Relational Characteristics		
Characteristic	**Virtual Breeding Environment**	**Virtual Collaborative Network**
Reciprocity	Low	High

Relational Characteristics		
Diversity of the content of ties	Single	Multiple
Homogeneity or heterogeneity	Homogeneous	Heterogeneous
Strong or weak commitments	Weak	Strong
Latent or current ties	Latent	Current
Intensity	Low	High
Duration	Long	Short
Communication channels	Few	A Lot

Table 4-2. Functional characteristics of a network

Functional Characteristics		
Characteristic	**Virtual Breeding Environment**	**Virtual Collaborative Network**
Exchange of resources	Low	High
Role of communication	Cooperation	Collaboration
Job relief	Medium	High
Nature of support	Cooperation	Collaboration
Available help	Medium	High
Assistance	Medium	High
Value and norm-orientation	Medium	High

Table 4-3. Structural characteristics a network

Structural Characteristics		
Characteristic	**Virtual Breeding Environment**	**Virtual Collaborative Network**
Size	Large	Small
Density	High	Medium
Cluster	Yes (Collaborative Spaces)	No
Intersections	Yes (among Collaborative Spaces)	No
Overlapping	Yes (among Collaborative Spaces)	No
Links	Direct	Direct
Type and pattern	Mesh	Mesh

As a summary of the previous classifications, the following *Table 4-4* gathers the main criteria for the *organizational structuring* of networks and the values of the criteria for both types of networks in NewBEE:

Table 4-4. Main criteria for the organizational structuring of NewBEE business networks

Dimension	Levels of organization	Virtual Breeding Environment	Virtual Collaborative Network
Subject specific	Low-High	Medium: Business Optimization in general	High: Specific Business Optimization project
Moderation	Constant-Variable	Variable: through Platform Administrator	Constant: through Virtual Collaborative Network Owner
Voluntariness	Low-High	High: Participation is voluntary	High: Participation is voluntary
Hierarchy	Hierarchic-Rather cooperative	Cooperative: Compatibility of goals, working apart	Collaborative: Joint Responsibility
Duration	Permanent-Occasional	Permanent: Long term	Occasional: Limited to the duration of the optimization project
Intervals of meetings	Discontinuous-Continuous	Discontinuous: quite discontinuous only when business opportunities arises	Continuous: quite continuous during the duration of the optimization project
Number of meetings	Small-Large	Very small	Medium
Division of labour	Low-Strong	Low: No division of labour at all	Strong: Very strong and well defined division of labour
Exclusiveness	Low-level access-Limited access	Low-level: open to all members interested in a particular BPM domain.	Access-limited: Limited access to the partners of the optimization project
Formalisation	High-Low	Low: Small degree of formalization	High: high degree of formalization (agreements and contracts)
Heterogeneity	Homogeneous-Heterogeneous	Heterogeneous: quite heterogeneous even though the subject is quite specific (Energy Retrofitting).	Homogeneous: quite homogeneous from the point of view of the topic (project) but heterogeneous in the members profile.
Range (spatial)	Local-International	International	International

4.4 NewBEE Collaborative Working Environment Life-cycle

Four stages are identified for the life-cycle of NewBEE networks:

- Set-up
- Operation
- Evolution
- Dissolution

In most of the physical organizations, the operation stage constitutes their entire business time because these organizations spend only a negligible fraction of their lifetime on the setting up and dissolution

stages. In contrast to physical organizations, the setting-up, evolution and dissolution stages of NewBEE collaborative networked organizations are complex and take up a considerable effort. This is certainly not a negligible fraction of time, and due to the involved complexity, these stages should be given proper attention during the development of NewBEE networks. Therefore, the presence of the life-cycle perspective for developing NewBEE networks is justified in order to guarantee the coverage and of all stages of their envisaged life span.

The four stages of the life-cycle of networks are described in the following text.

4.4.1 Network set-up

The NewBEE network set-up or creation stage deals with incubation, system parameterization, databases creation, generation and definition of ontology or common terminology, data/information loading, etc. The set-up stage is applicable to both the VBE and VCN, and includes two services: creation and joining.

"**VBE creation**" service is more an organizational activity than an ICT activity. This service implies the agreement among members of an existing physical community (knowledge and/or business) to evolve towards a Business Community by using ICT platform. The ICT platform is based on a social networking framework, which provides the necessary functionality to allow running an own social networking site, and where the criteria for joining the VBE can be defined by founders.

Once the VBE has been already created, the practitioners (RTDs SMEs and other relevant stakeholders) or individuals from the physical community or open universe will then be able to join the VBE by using the "**VBE joining**" service.

"**VCN creation**" service is intended to enable VBE members to find partners within this network, who are suitable and willing to develop a business optimization opportunity (i.e. energy retrofitting project) with precisely defined collaboration goals and conditions. The search is done based on several criteria, such as the potential VCN partners' expertise, resources, location, etc.

The "**VCN joining**" service is intended to enable initially selected organizations to join a VCN under predefined conditions by inserting requested data, signing corresponding agreements, etc. This service allows also additional partners to join an existing VCN. The additional partners' involvement might happen either by invitation or by own application and acceptance by the existing partners.

4.4.2 Operation

Certainly this is the most important phase, when the networks actually operate towards achieving its goals. Different tasks will be executed at this stage depending on the type of network:

- VBE operation is focused on the identification of performance-based retrofitting Business Opportunity (BO)
- VCNs operation is mostly focused on co-developing their processes aimed energy retrofitting project, based on a BO, applying NewBEE Services. These services will be shaped towards best available business models for energy retrofitting process through the identification of retrofitting technologies, organizational and financial models based on the building typology, building uses, climate condition, regional legislation, etc. and objectives investigated within the Collaborative Spaces.

4.4.3 Evolution

During the daily operation stage of a network, it becomes necessary to adjust it slightly, e.g. to its membership, structural relationships, roles of its members, etc. Therefore, the network can go through daily adjustment or evolution process simultaneously to its operation stage.

4.4.4 Dissolution

A short-term collaborative network, such as a VCN, will typically dissolve after accomplishing its goals i.e. finish a collaborative energy performance-based retrofitting project.

5 Identification of a business opportunity and creation of the associated Virtual Collaborative Network

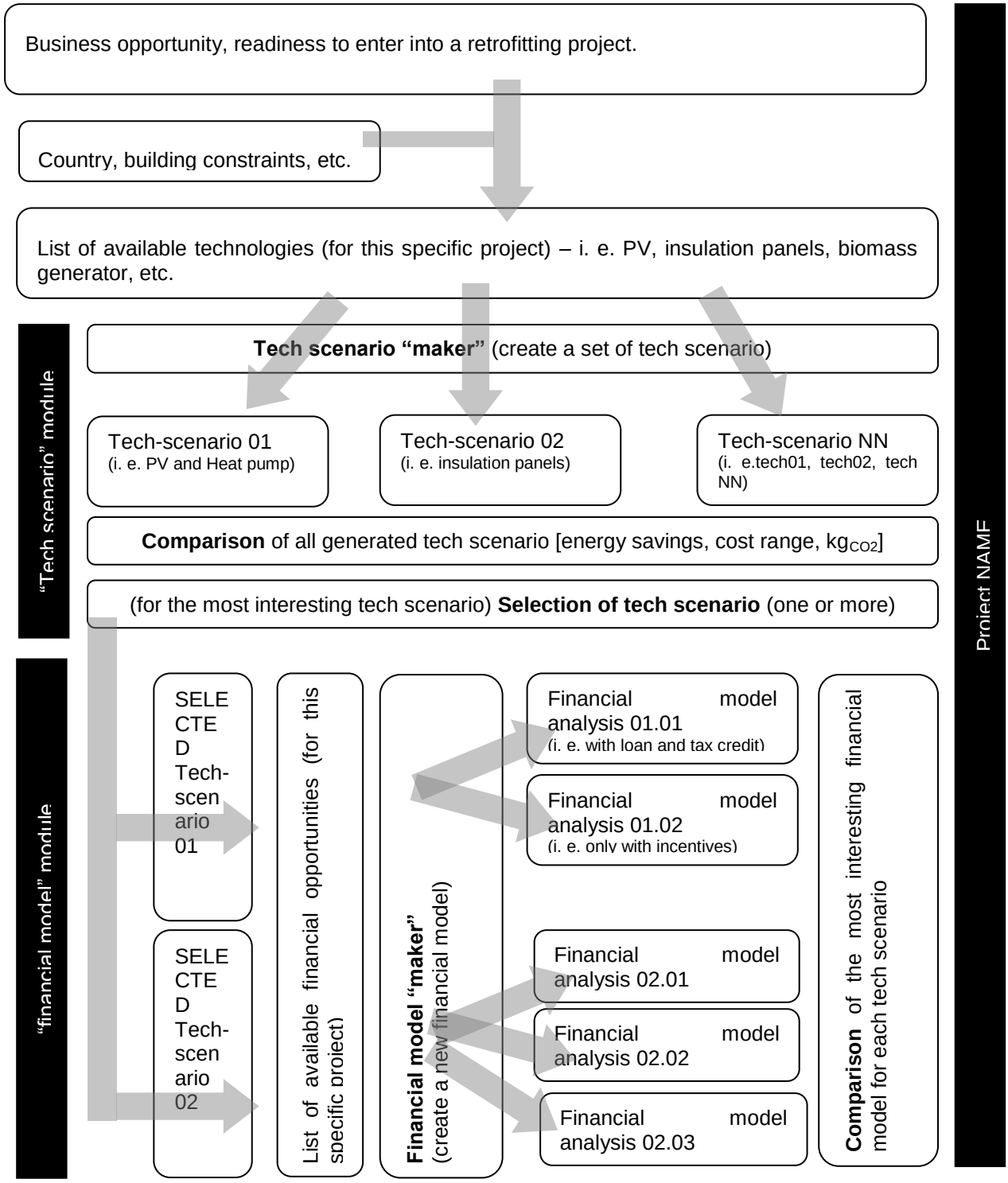
5.1 Making a rough assessment of a BO appropriateness using the Pre-assessment tool

The pre-assessment tool is based on the building typology and integrates best practices and most advanced technologies in the pre-assessment of buildings for retrofitting projects. In one hand, it intends to give any kind of information about the aspects that are relevant to be considered in a retrofitting project. Building owners or users are allowed to introduce general building parameters into the NewBEE platform - such as square metres, building type and current building structure or windows - to receive a first impression on where to start retrofitting and to identify the most appropriate retrofitting technologies based on their requirements.

On the other hand, users save the list of technologies suitable for the on-going analysis and go further in the “NewBEE pre-assessment wizard” analysing the energy and economical topics (see section 5.1.1).

*Figure 5-1*shows the process for the pre-assessment tool:

Figure 5-1 Detailed process for the pre-assessment tool



5.1.1 Analysing the technological and economic issues of a retrofitting opportunity

At this step of the analysis, the NewBEE methodology presents the list of available technologies that can be applied to the building(s) of the project. The user of the platform might be interested to make evaluations both for all available technologies and else for part of them. The "tech scenario module" lets user (mainly **building owner**) create, save/edit and compare a multitude of refurbishment scenarios composed by all available technologies or by a selection of them. The target of the module is to evaluate the energy savings potential, the related CO_2 emissions reduction and the cost range of the intervention. First indicators about the economic analysis of the project are shown. The results of the process at this stage must be considered as a first indication of the refurbishment potential actions.

The steps of analysing the technological and economic issues of a retrofitting opportunity are shown in *Figure 5-2*:

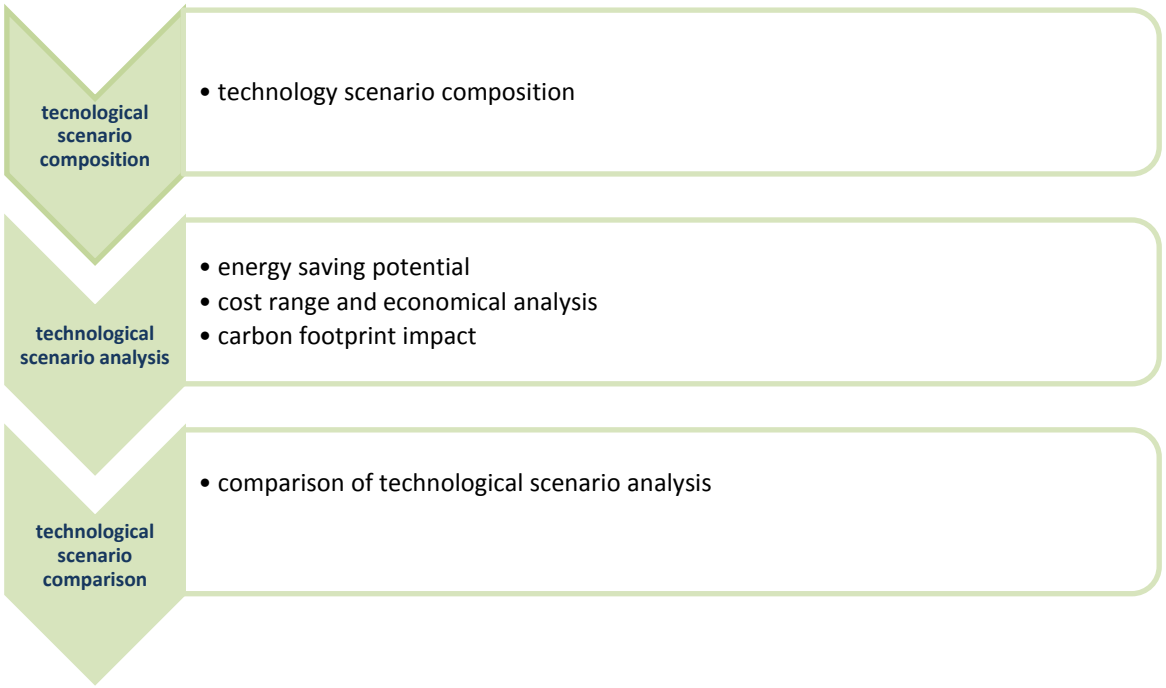


Figure 5-2 Process for the analysis the technological and economic issues of a retrofitting opportunity

1. **Technology scenario composition (Create NEW tech scenario)**

"Create NEW tech scenario" lets user (mainly building owner) select all or only part of available technologies (NewBEE system displays only technologies interesting and suitable for the specific project) and evaluate the magnitude of energy potential savings and associated costs. The system enables user:

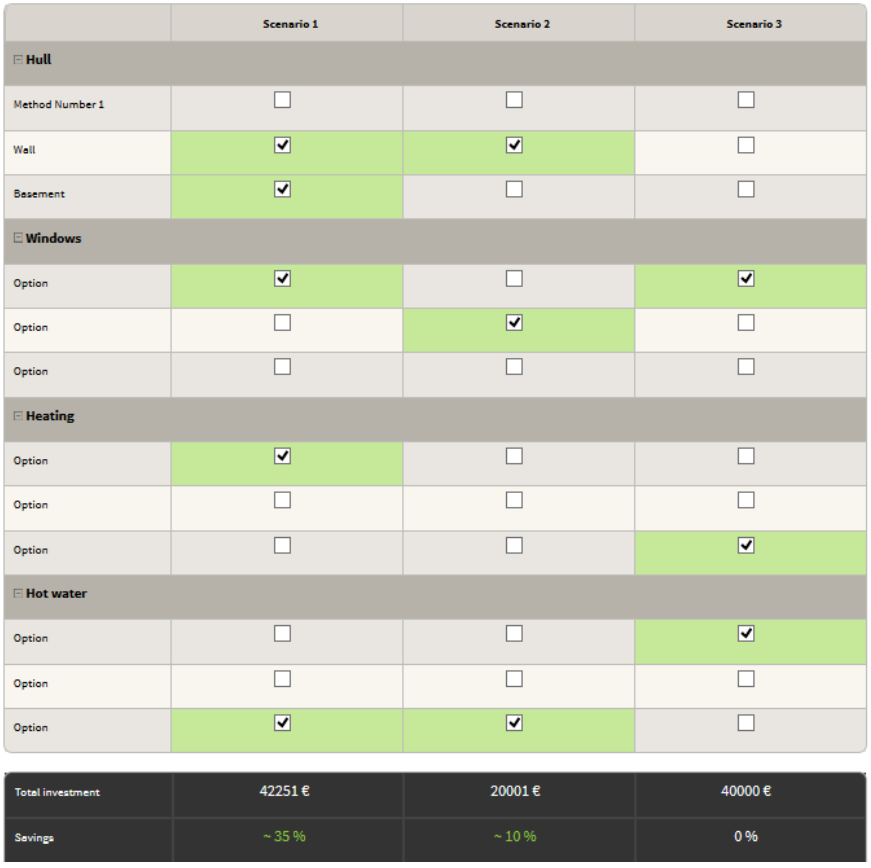
- to evaluate the biggest energy potential (likely when all technologies are selected);
- to evaluate the savings and related cost range in the thermal domain when only thermal technologies are selected (technologies that not generate or save electricity);
- to evaluate the electrical saving and related cost range when only electrical technologies are selected;
- to evaluate a custom set of technologies (in according with clients, customers, stakeholders, etc.)
- to evaluate the potential of reduction in carbon emissions (in case of electrical energy displacement:

2. **Description of the analysed scenario and edit functions**

The second section of this module lets users view/sort/comment/analyse/edit/cancel the list of created tech-scenario. The NewBEE methodology helps users to modify the technology selection, to add

comment, to modify the parameters proposed by the platform i.e. value for energy savings and technologies costs.

Interactive functionalities will enable users to understand the effect on costs, energy savings and carbon footprint impact of a technology or a set of technologies. Next picture explains the process of the development of energy saving potential process. The user can generate different scenario. For example the tech-scenario 03 analyzes the energy saving, carbon footprint impact and cost range of only three technologies (one related to windows technologies, one related the heating system and one related to hot water generation) (see *Figure 5-3*).



	Scenario 1	Scenario 2	Scenario 3
Hull			
Method Number 1	☐	☐	☐
Wall	☑	☑	☐
Basement	☑	☐	☐
Windows			
Option	☑	☐	☑
Option	☐	☑	☐
Option	☐	☐	☐
Heating			
Option	☑	☐	☐
Option	☐	☐	☐
Option	☐	☐	☑
Hot water			
Option	☐	☐	☑
Option	☐	☐	☐
Option	☑	☑	☐
Total investment	42251 €	20001 €	40000 €
Savings	~ 35 %	~ 10 %	0 %

Figure 5-3 Different scenarios for energy savings and carbon footprint impact of a technology or a set of technologies

3. Compare the tech-scenario

NewBEE methodology helps the user to select a set of technologies (the composed scenario) and to compare them in a usable and graphical intuitive fashion. Each tech-scenario will provide information about:

- the magnitude of energy savings;
- the magnitude of costs;
- the CO_2eq carbon footprint savings.

In addition to this, the user can select the most interesting tech-scenario and save them in a portable document format (pdf) or add the information and the user's requirements in the NewBEE platform.

The NewBEE system would be able to archive the tech-scenario information in a database by using user session variables. If the user (building owner) wants to save all the technology scenario analysis, he/she will be required to became first a member of the NewBEE system. All the technology scenarios will be linked to his/her membership. For registered members, NewBEE system proposes additional modules; for example the financial model module. The "financial model generator" module responds to question related to "how to finance the tech scenario" and "what is the magnitude of revenue stream generated by each technology scenario" see (5.1.2 Analysing the financial issues of a retrofitting opportunity).

5.1.2 Analysing the financial issues of a retrofitting opportunity

The envisioned module intends to provide the user with detailed financial calculations. The financial calculator goes beyond the Pay Back Period analysis and let users investigate the effects of different assumptions in terms of energy savings, energy price forecasts, and financial methods. It also provides information about the present value of cash flow sums.

When taking into account the schematic representation of the methodology, *Figure 5-4*, it shows that the first part of the module collects data about forecasted energy savings and about investment costs. Users that already know them can provide customized data. Users with low experience in that field can recall figures calculated by previous analysis made within the pre-assessment module.

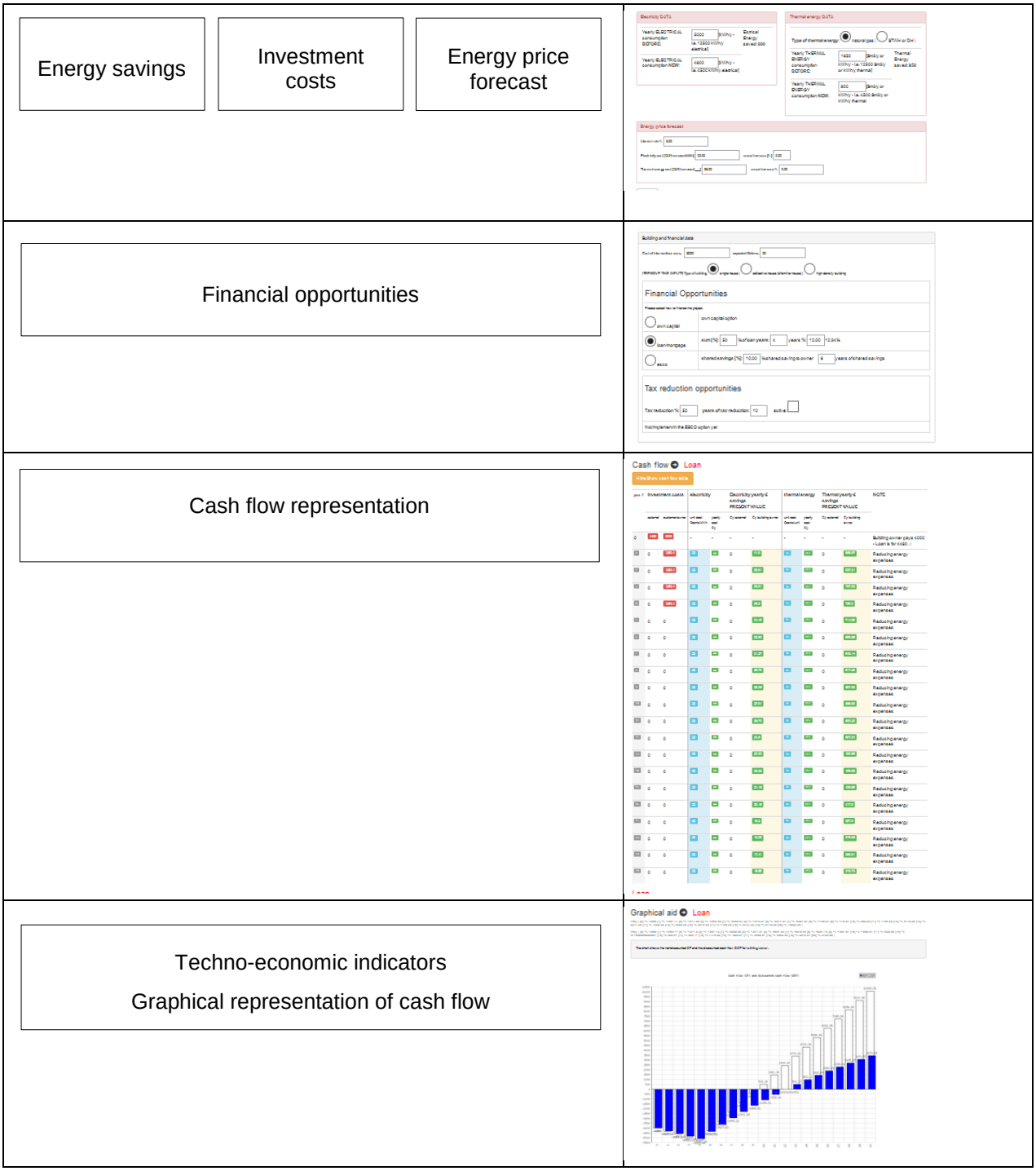


Figure 5-4 Financial calculator module

The second part of the module asks users to select the forecasted way to finance the project. Users can generate a simulation on the distribution of their cash flow will be when they finance the project by one of the financial models described in WP 4, task 4.1.

Taking into account the expected lifetime of the retrofitting project, the financial calculator module generates a set of information that helps users to understand the economic cash flow of the investment. More information will be given by generating a set of techno-economic indicators (Payback Time, Net Present Value, IRR, etc.). The cash flows are represented both in numerical and graphical ways.

Users can “save” the analysis in their NewBEE account which they can eventually link to technology scenarios developed within the pre-assessment tool. They can also generate a pdf as a portable-summary of analysis.

5.2 Identification of the most appropriate retrofitting technologies based on user requirements

SMEs will be able to identify business opportunities on the market place which are suitable for their competences and interests. The identification of interesting business opportunities have been done by using a structured filtering list. Once the business opportunity is identified, SMEs start to investigate the kind of technologies which fit optimally the user requirements. NewBEE system provides a set of automatic filters that make a first rough screening of technologies. Examples of standard filters are:

- Kind of energy: different energy typologies have been considered.
- Season: in which season is expected to be implemented the designed project.
- Whether it is considered as an envelope or a system.
- The climate of the area.
- Professional skills.
- Building typology.
- Existing building technologies: roof technologies, façade, Inner wall technologies, HVAC technologies, etc.
- Generation or demand: depending on the user’s needs, the generation model would choose one of two possibilities - either how to generate energy with minimum resources or how to demand minimum energy resources.

As it was explained in the “D2.3 Best Practices Analysis and Selection” two main classes of factors have been defined in order to evaluate the structural and physical aspect of the technology (Table 5-1), and the second class investigates the techno-economical point of view (Table 5-2).

The first class of indicators addresses the SMEs to understand which technologies have met their needs. The implementation of the scheme in a web-based tool lets SMEs to select the best technological options in a user-friendly manner.

Table 5-1– List of structural factors

Structural Factors	Options
kind of energy	Electricity (E), thermal (T),
save or generating	saving (S), generating (G)
season	both (B), winter (W), summer (S),
Building type	both (B), single (S), collective ©
envelope or system	envelope (E), systems (S)
Categories	envelope (E), heating (H), DWH , electricity generation (EG), cooling ©,
Energy Supply/ Savings profile	programmable , continuous, unpredictable

This simple scheme brings SMEs to a list of technologies that satisfy their queries, i.e. a technology for saving energy in a cold climatic area suitable for collective building related to the envelope.

Once the technologies have been selected, the second class of indicators gives to SMEs information about the techno-economic feasibility of the selected technologies.

Table 5-2 List of economic factors

	Factors	Options
economic factors	Capital cost per unit	low – medium – high
	Entity of auxiliary works	low – medium – high
	Ancillary costs	low – medium – high
	O&M costs	low – medium – high
	Programmable/ continuous/ unpredictable	continuous – programmable – unpredictable
	Life time	low – medium – high
	Scalability	low – medium – high
	Saved or generate energy per unit	low – medium – high
	Link with incentives	yes – no
	WhC scheme	yes – no
	Synergy with other technologies	low – medium – high
	PBT	<10 – 10-20 - >20

The process of the identification of the most appropriate retrofitting technologies is explained in the *Figure 5-5* in a methodological way.

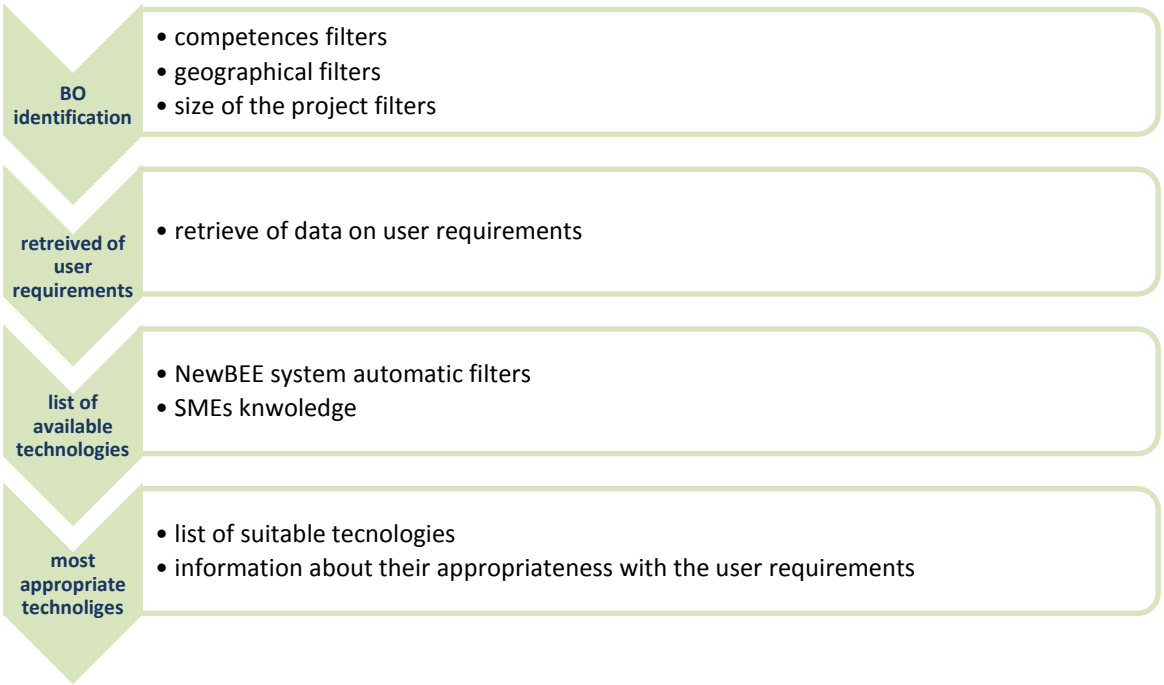


Figure 5-5 The process of identification of the most appropriate retrofitting technologies

After the identification of the most appropriate technologies, the next step allows SMEs to use its specific and in-deep knowledge for assessing which technologies are the most appropriate are according to the user requirements.

Such a user-requirement driven way of identifying retrofitting technologies is considered as a training tool. The pre-assessment tool offers the user the possibility of formation: the auto formation (that could also be

defined as a self-learning program), on-line assistance, and other aids to use the pre-assessment tool It will assist the user on all the knowledge gathered refering to the use of the pre-assessment tool, and particularly, the reasons for using this tool, the reason for its application and when it will be of usefulness.

5.3 Creation of the Virtual Collaborative Network (VCN)

A Business Opportunity (BO) will become a business reality by using the NewBEE Collaborative Working Environment (CWE). A BO that is identified by a building owner, retrofitting SME or other stakeholders can be introduced into the NewBEE platform though the VBE in order to became a VCN that answers properly the BO. There are 2 ways of introducing the identified BO depending on whether one is a member of the VBE:

a) The BO is identified by a VBE non-member.
b) The BO is identified by a NewBEE network (VBE) member.

a) The BO is identified by a VBE non-member.

This is the case of building owners, architects or other people interested in retrofitting projects. These private actors would like to understand whether their building's energy performance can be improved and to evaluate the energy saving and economical potential. The methodology lets the user to **insert its BO into the VBE**:

- Simple registration to the platform: building owner must register (not as a member of NewBEE Platform but as a "guest") to the VBE; required data are at least: name, surname, contact information, address;
- Insert the BO in the database: a private owner should provide the information of the potential business opportunity: title, description, geo-location, timing, etc.; information is collected by user-friendly wizard form organized in steps; moreover, pictures and other specific information can be added. Figure 5-6 and Figure 5-7 illustrated the first step of the aforementioned data-collection process).

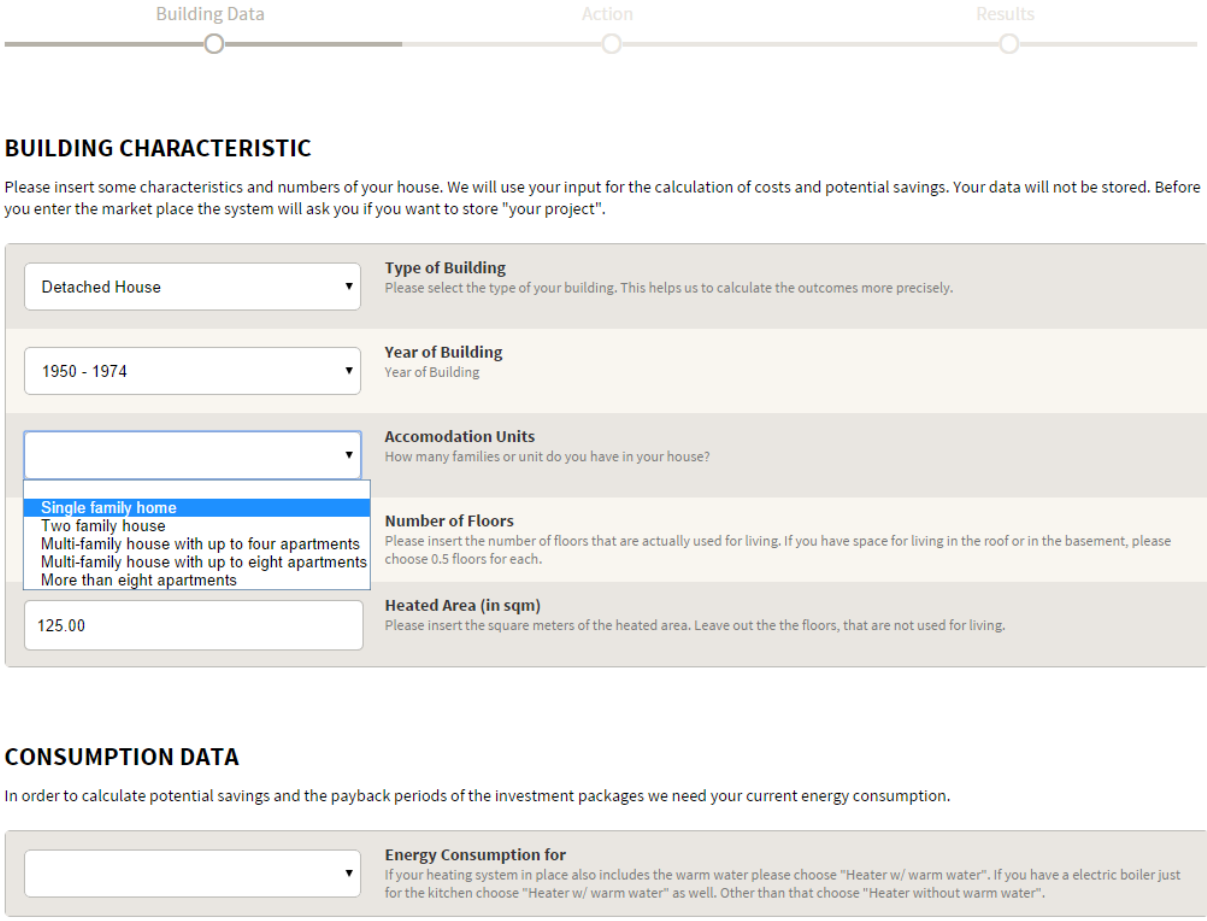


Figure 5-6 Description of the Business Opportunity

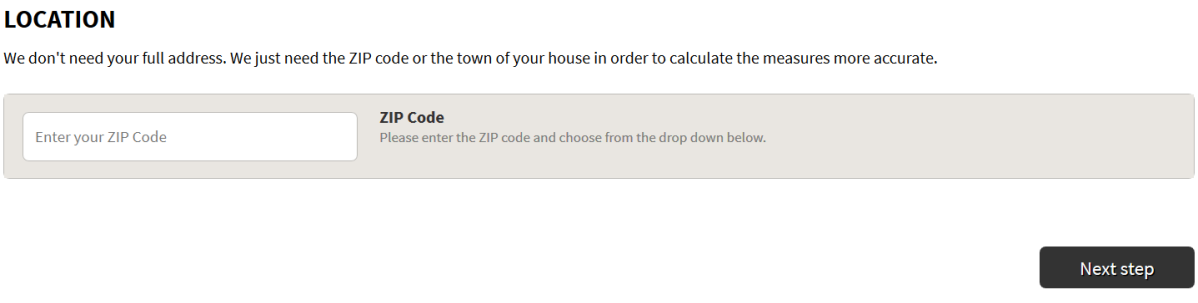


Figure 5-7 By adding their ZIP code, private member users add the geo-location of the business opportunity

Once the BO has been inserted the VBE sends an alert to VBE members (SMEs and stakeholders) which “alert options” match with the BO description and characteristics. The BO is visible by all VBE members and they receive an alert for answering to the “call for proposal” in order to create a VCN for the specific project (see *Figure 5-8*):

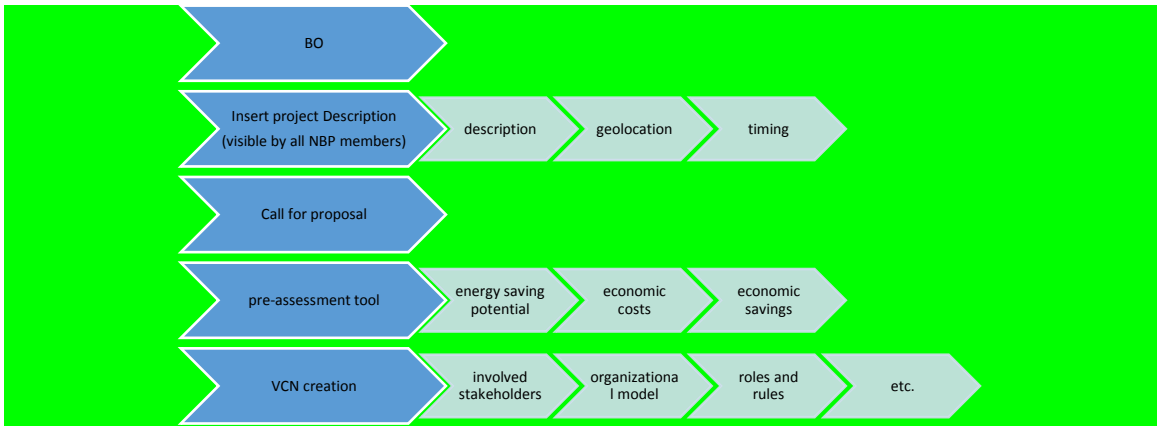


Figure 5-8 – Process for creating the VCN when BO identified by a VBE non-member

c) <u>The BO is identified by a NewBEE network (VBE) member.</u>

NewBEE VBE members (registered SMEs and stakeholders) identify one or more BOs. A member can use both the pre-assessment tool and the VCN creation tool depending on the level of knowledge. Once the BO has been added into the platform, the BO is visible only by the member who proposed it. The VCN creation process is made by searching for SMEs and by inviting them (see the *Figure 5-9*).

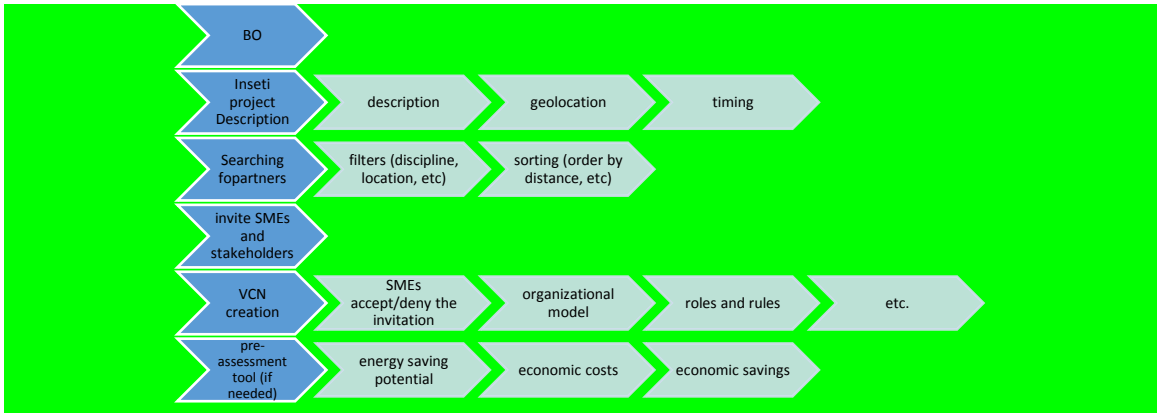


Figure 5-9 – Process for creating the VCN when BO identified by a VBE member

Once the BO is added, a search for potential partners can commence. The BO owner has to identify the project scope, the project organization, partner's selection and so on. The result of the searching process is a list of potential partners classified by actors typologies identified in "*D1.1 Classification of Building Typology"* (owners, funds, tenant, and so on) and ranked according to their retrofitting history (number of collaborative projects, references by other members, etc.).

These typologies of actors are:

- Owners (private, commercial, public)
- Funds/Banks/Grant Managers/Investors (short-term/long-term)
- Tenant (private, commercial, public)
- Urban Managers
- Architects and Designers
- Engineering firms
- Planners
- Craftsmen
- Construction Companies
    - General contractors
    - Subcontractors
    - Construction Suppliers
- Retrofit Providers (e.g. Energy Service Companies (ESCOs))

- Technology and solution providers
- Energy Suppliers
- Policy makers (Federal/Regional/Municipal)
- Public Ministry (Energy Department)

Once the project is in such a draft form, the search process could be carried out. Perhaps all is clear in user´s mind but before selecting the different stakeholders to be involved in the project, the project scope must be defined and on the other hand a project organization and the selection of roles must be carried out. The owner (a typology of user), is normally the principal user that can use the platform in order to find different actors that could materialise the proposed improvements.

In some other occasions, the main contractor or an organization may be the principal platform user searching for feedback that would match the needs of the final client (or clients) through this system.

Once running the search engine the result of that particular search will display a ranked list of some organizations.

Such a ranking will consist of a punctuation made to each one of the organizations based on an algorithm that will take into account different parameters such as:

- Number of collaborative projects in which the organization may have been participating.
- The punctuation made (cross punctuation) by each one of the members involved in the collaborative space.
- Valuation of the technologies that the organization is capable of implementing and, where applicable, the success in the implementation and in the responsibility of the organization when collaborating as part of a consortium including the agreements made.

In that way, some criteria are valid and homogeneous to all organizations, and at the same time and for each one of the organization there is a possibility to know some additional information of the listed organizations, the technologies that could be implemented, the best practices that support its performance, the ranking position among the same typology of organizations, the number of occasions applying a particular technology, and so on.

Once the organizations have been searched, the BO owner will have additional information to open the possibility to create a VCN in the same way as mentioned in this document.

6 Energy Efficient Services and applications

6.1 Overall System description

In this methodological block is explained how the energy saving potential is calculated in detailed, how the retrofitting cost is calculated and which of the financial schemes are more appropriate for the energy retrofitting process. The user of this block will be an advanced user with high knowledge of retrofitting technologies, techniques and the parameters required to make a precise energy saving calculation with each proposed technology. Therefore this block is intended for the professional users, for the retrofitting SMEs, not for the building owners.

There are other inputs to be taken into account apart from all initial criteria which have been tested by the building owner when making a rough assessment of a BO appropriateness using the Pre-assessment tool as it has been described in the previous section. The building owner has to choose the best option from the available technologies which can fulfill his/her objective either on his own or supported by professionals in the field.

Different criteria can be established such as:

- Price as an economic factor due to final client's financial capacity.
- The quality as a factor that does not take into account the price but the guarantees and the durability of materials.
- Good Price vs. Quality factor that besides taking into account the price, it will also take into account the durability.

These new inputs however, are related to the real case, and are specifically related to the retrofitting particular items and organizations that are really interested in implementing the solution provided by NewBEE Platform, that is, selected organizations carrying out the project to find an energy performance business model.

All the construction items expected to satisfy the final needs, the outputs of the available technologies (or selected technologies) and the above mentioned criteria, has been added to the Energy Efficient Services (EES).

Once construction items and technology options are selected with adequate validation mark-ups (only one can be selected among the various shown), and the costs per item are inserted, the professional user (SME) would have to run the pre-EES module which would contain algorithms that will present the best technologies available to deal with the future implementation of the energy performance business model.

The information to be introduced could come from the pre-assessment module (the one intended for non-professional users), but in this module will be completed in order to reach the following outputs:

- Legislation to be considered.
- Best available technologies under user perspectives and needs.
- Energy performance assessment.
- Cost assessment: this module would have to provide a kind of real orientation of the intervention cost. It will be an estimated value. In that way several dimension parameters have to be included.
- Financial Models: Costs and savings will be considered, and more than one suitable model will be prompted from the EES service.

EES is linked to the framework for a new Performance-based business model for energy-efficient building retrofitting.

Therefore, the NewBEE methodology supports SMEs in finding relevant information and suitable methods to design and implement energy-efficient building projects:

1. to understand the energy and cost saving potential of renovation projects
2. to introduce your renovation project
3. planning and defining your renovation project and set target and requirement levels
4. to find information about energy performance regulations and incentives for renovation projects
5. to find available technologies for energy-efficient renovation
6. to find information about the assessment methods (dynamic, steady state)
7. to use appropriate tools for the assessment of energy performance

8. to make cost assessment of renovation projects
9. to find and assess the suitability of financial models
10. to find appropriate procurement models
11. to input information to NewBEE Case Repository and make use of existing information when planning a renovation project
12. to search for partners from NewBEE community.

Next picture depicts the above mentioned issues and the relation among them:

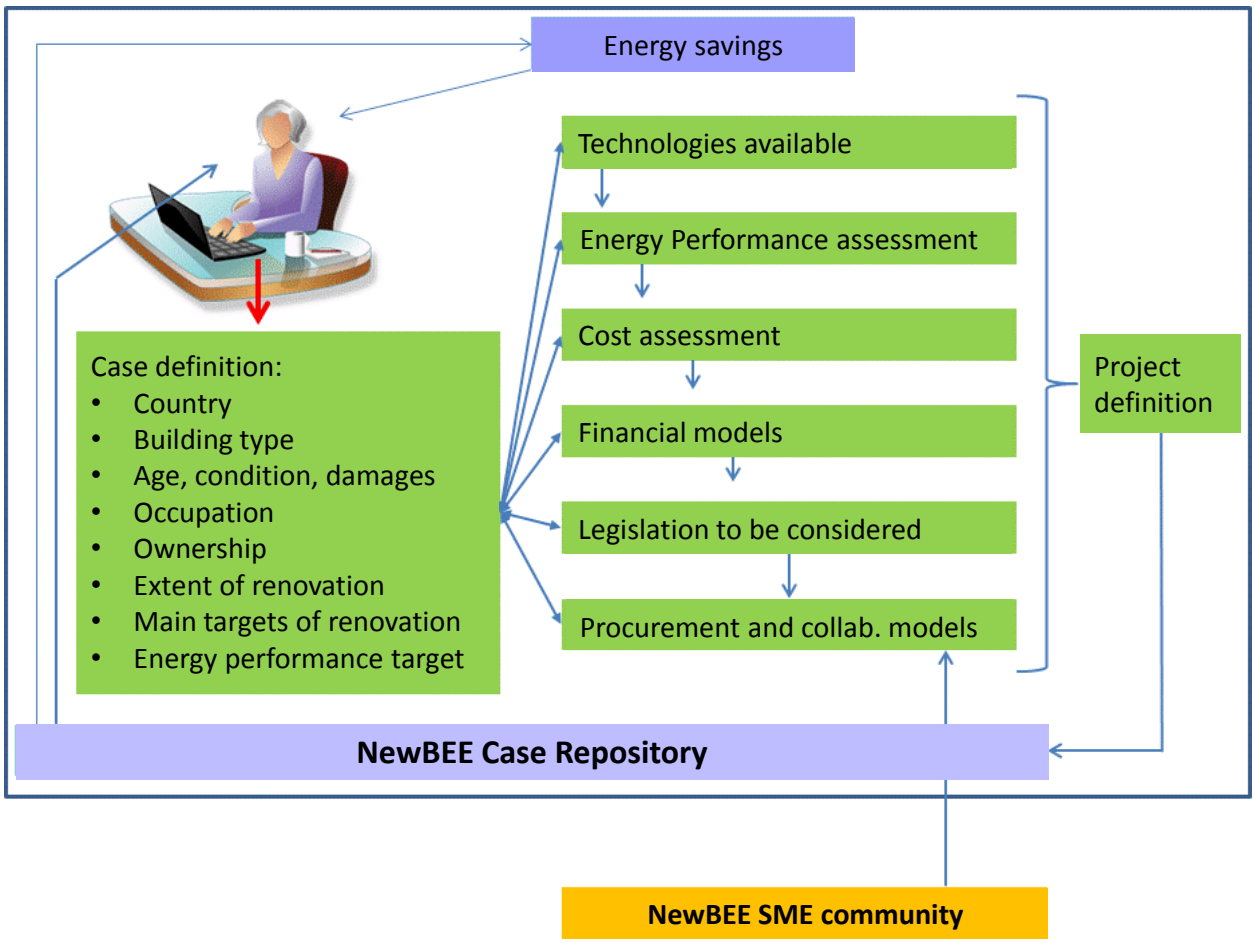


Figure 6-1 NewBEE System description

The methodology supports the above mentioned issues 1, 3, 5, and 8 by providing the Energy Efficiency Services (ESS) for use as described in Section 6.2. The methodology supports the issues 4, 5, 6, 7, and 10 on Collaborative Knowledge Management (on a Wiki basis as described in Section 8. The methodology supports the issues 2, 9, 11 and 12 with the help of the Collaborative Working Environment (chapter 4) and the identification of a BO and creation of the associated VCN (5.3).

6.2 Energy saving potential

The methodology intends to understand the potential of energy performance upon renovation:

- to roughly understand the energy saving potential of different renovation measures.
- to understand the order of magnitude of investment cost and saving potential.

The methodology supports SMEs to understand the energy saving potential and assess costs and energy saving potential by providing an access to ESS module. The following figures explain the main services NewBEE will offer. The process is based on four steps:

- Step 1 Give Basic data
- Step 2 Results before measures

- Step 3 Apply measures
- Step 4 Results of the Before and After

Figure 6-2 describes the process of the above mentioned steps that the ESS provides:

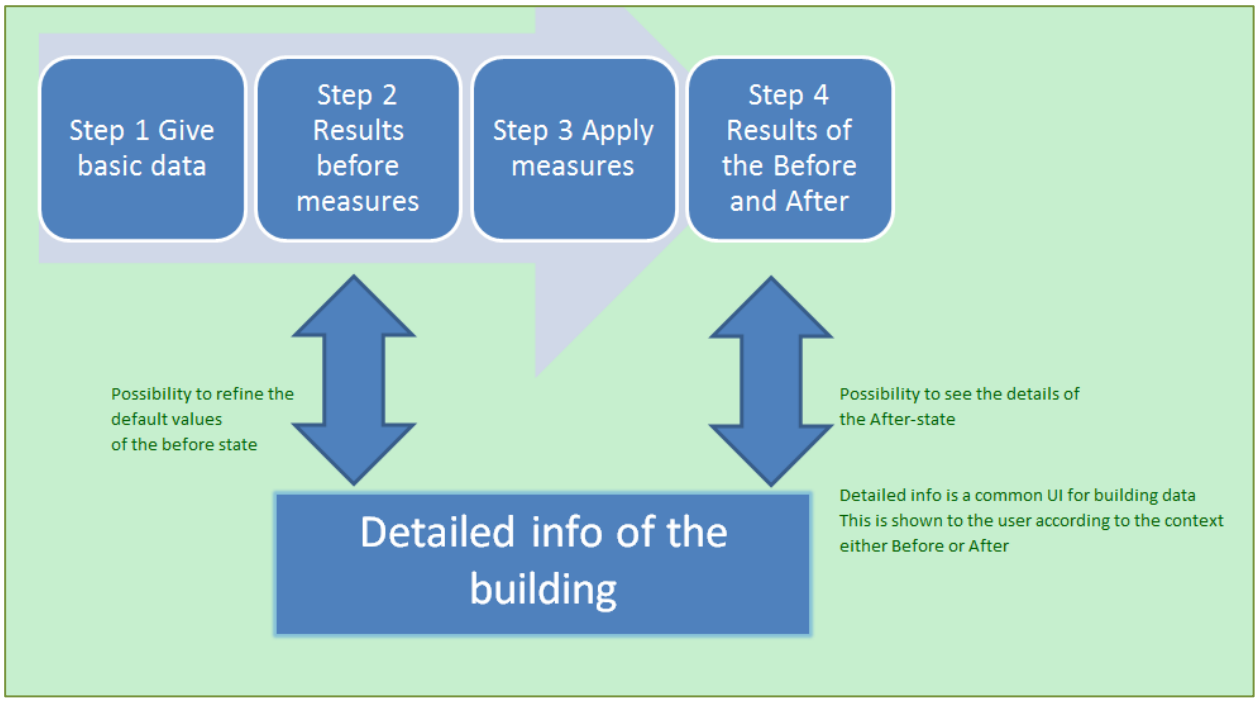


Figure 6-2. Description of the ESS process.

Figure 6-3 highlights what kind of initial information the user will have to provide (Step 1 – Give basic data). The "Before" state of the building is obtained once the basic data of the renovated building to be assessed is defined.

Please define the basic data of the renovated building to be assessed and easily get the "Before"-state of the building.
You can view the detailed information of the building in the Step 2 and change the information, if needed.

	Example data
Name of the assessed building:	New building
Country:	Finland
Weather data	Helsinki
ZIP code	2014
Building type:	Apartment building
Construction year:	2014
Heating set point (°C):	21
Cooling set point (°C):	27
Heating type:	District heating
Cooling type:	
Conditioned floor area (m²):	1500
Number of floors	4
Floor height (m)	3
Number of residents (-):	31

The tool uses shoe-box modelling for the building geometry, please define the shape factor

Shape factor (X/Y):	0.3

Figure 6-3 Plan of initial information to be given by the user of the ESS module (Step 1).

Figure 6-4 shows what kind of information ESS will have to provide to describe the present situation (Step 2 Results before refurbishment).

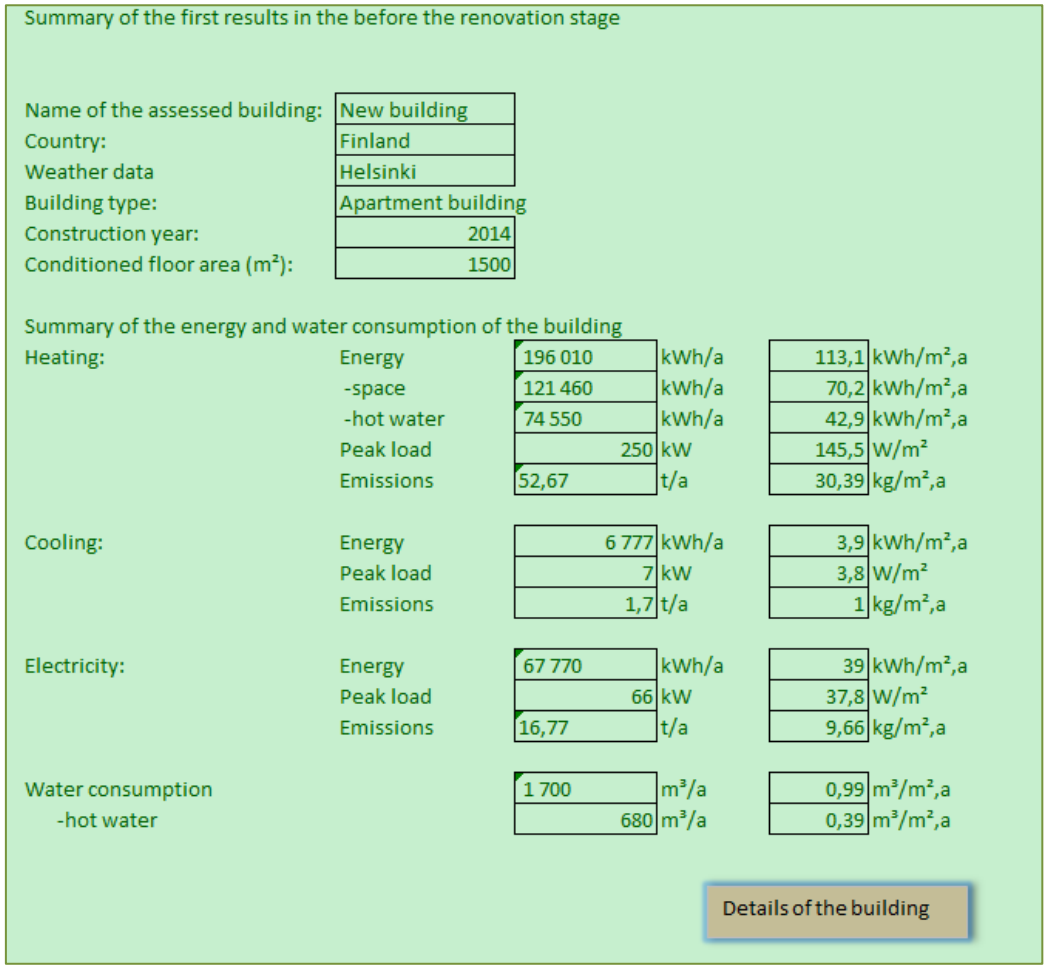


Figure 6-4 Description of information that ESS has to provide to describe the present situation (Step 2 – Results before refurbishment).

Figure 6-5 depicts what refurbishment methods the professional user of ESS will have to select for the renovated building:

- Improvement of air tightness of the building envelope
  - Sealing the envelope
- Improvement of thermal performance of the windows
  - Assembly of additional glass
  - Replacement of windows with energy efficient windows
- Retrofit of the thermal insulation in outside walls
  - External thermal insulation panel systems
  - Insulating rendering
  - Cavity wall insulation, bulk material insulation
  - Cavity wall insulation, foam injection
  - Plasterboard of fibreboard laminated fixed inside the existing wall
  - Insulation boards fixed inside the wall timber studs and covered with the plasterboard
  - Vacuum insulation panels inside the wall
  - Replacement of the insulation material
  - Demolishment of the non-load bearing parts of the external wall and replacement

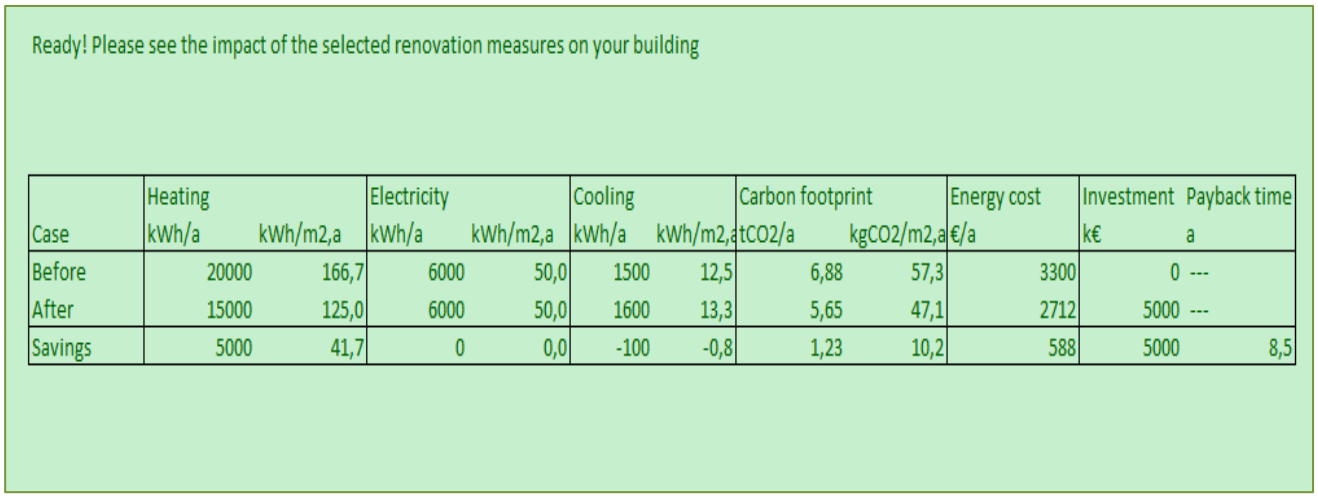
- Improvement heat insulation of base floor
    - Adding layers of insulation material on top of existing floor
    - Replacing the existing insulation material with a more effective insulation
    - Adding insulation thickness
- Passive cooling with solar shading
    - Window coating
    - Internal shading
    - External shading
- Improvement of the mechanical ventilation
    - Heat recovery for ventilation system
- Improvement of the hot water system
    - Heat recovery of grey water
- New water efficiency taps
- Improved or changed heating system
    - Connection to the district heating system
    - Ground source heat pump
    - Air to water heat pump
    - Change of boiler to enable the use of wood pellets instead of oil
    - Renewal of oil boiler or oil burner to improve the efficiency
- Auxiliary heating systems
    - Solar collectors to the hot water heating
    - Air to air heat pump to heat the spaces
- Improved or changed cooling system
    - New cooling device

Please apply selected refurbishment methods for the renovated building

Improvement of air tightness of building envelope	Leakage air value n50 Pa (1/h)	
	Before	After
Sealing the envelope	3,5	1
Improvement of thermal performance of windows		
	U-value (W/m²,K)	
None	Before	After
Assembly of additional glasses	1,8	1,5
Replacement of windows with energy-efficient windows	1,8	0,75
Retrofit of the thermal insulation in outside walls		
	U-value (W/m²,K)	
None	Before	After
External thermal insulation panel systems	0,25	0,18
Insulating rendering	0,25	0,15
Cavity wall insulation, bulk material insulation	0,25	0,2
Cavity wall insulation, foam injection	0,25	0,18
Plasterboard or fibreboard laminates fixed inside the existing wall	0,25	0,18
Insulation boards fixed inside the wall with timber studs and covered with plasterb	0,25	0,2
Vacuum insulation panels inside the wall	0,25	0,1
Replacement of the insulation material	0,25	0,2
Demolishment of the non-load bearing parts of the external wall and replacement	0,25	0,1
Improved heat insulation of base floor		
	U-value (W/m²,K)	
None	Before	After
Adding layers of insulation material on top of the existing floor	0,18	0,15
Replacing the existing insulation material with a more effective insulation	0,18	0,15
Adding insulation thickness	0,18	0,15
Passive cooling with solar shading		
	Curtain factor (-)	
None	Before	After
Window coating	0,75	0,35
Internal shading	0,75	0,5
External shading	0,75	0,1
Improvement of the mechanical ventilation	Heat recovery efficiency (-)	
	Before	After
Heat recovery for ventilation system	0	0,65
Improvement of the hot water system	Heat recovery efficiency (-)	
	Before	After
Heat recovery of grey water (sewage wash water)	0	0,3
	Hot water demand reduction (-)	
New water efficient taps (showers, toilets and kitchen)	0	0,25
Improved or changed heating system		
	Heating system efficiency	
None	Before	After
Connection to the district heating system	0,85	0,95
Ground source heat pump	0,85	3,1
Air to water heat pump	0,85	2,1
Change of boiler to enable the use of wood pellets instead of oil	0,85	0,85
Renewal of oil boiler or oil burner to improve the efficiency	0,85	0,9
Auxiliary heating systems		
	Share of demand to be satisfied	
None	Before	After
Solar collectors to the hot water heating	0	0,5
Air-to-air heat pump to heat the spaces	0	0,5
Improved or changed cooling system		
	Cooling system efficiency	
None	Before	After
New cooling device	2,5	3,5

Figure 6-5 description of the refurbishment methods the SMEs will have to select for the renovated building (Step 3).

Figure 6-6 shows what kind of information the ESS has to give to describe the situation after refurbishment (Step 4 – Results after refurbishment).



Ready! Please see the impact of the selected renovation measures on your building

Case	Heating kWh/a	Heating kWh/m2,a	Electricity kWh/a	Electricity kWh/m2,a	Cooling kWh/a	Cooling kWh/m2,a	Carbon footprint tCO2/a	Carbon footprint kgCO2/m2,a	Energy cost €/a	Investment k€	Payback time a
Before	20000	166,7	6000	50,0	1500	12,5	6,88	57,3	3300	0	---
After	15000	125,0	6000	50,0	1600	13,3	5,65	47,1	2712	5000	---
Savings	5000	41,7	0	0,0	-100	-0,8	1,23	10,2	588	5000	8,5

Figure 6-6 Description of information that ESS has to give about the situation after refurbishment (Step 4 –Results after refurbishment).

Figure 6-7, Figure 6-8 and Figure 6-9, describe the type of information which the ESS has to use in the calculation. The methodology allows the user to change the default values if customized information is available.

The ESS has to assess the energy consumption of the building, using a calculation method that is based on the simple single zone steady-state thermal analysis. The calculation is based on the Finnish Building Regulation D5 and the European standard EN 832.

Please view and correct the parameters of the building to be assessed, if needed

Name of the assessed b	New building
State	Before
Country:	Finland
Weather data	Helsinki
Building type:	Apartment building
Construction year:	2014
Heating set point (°C):	21
Cooling set point (°C):	27
Heating type:	District heating
Cooling type:	
Conditioned floor area	1500
Number of floors	4
Floor height (m)	3
Number of residents (-	31

Building envelope properties

Outside walls	Area (m²)	U-value (W/m²,K)
	949	0.25
Roof	Area (m²)	U-value (W/m²,K)
	382	0.22
Floor	Area (m²)	U-value (W/m²,K)
	382	0.18

Windows

Orientation	Area (m²)	U-value (W/m²,K)	g-value (-)	Curtain cactor	Frame factor (-)	Horisontal shading (degrees)
South	90	1.8	0.68	0.75	0.9	15
East	18	1.8	0.68	0.75	0.9	15
West	18	1.8	0.68	0.75	0.9	15
North	54	1.8	0.68	0.75	0.9	15

Ventilation and infiltration

Mechanical ventilation system

Air flow (m³/s)	0.65
Heat recovery efficiency (-)	0.5

Please define when the ventilation system is on

Schedule	Begin	End	On factor	Other time factor
Workdays	0:00	23:00	1	0
Saturday	0:00	23:00	1	0
Sunday	0:00	23:00	1	0

Figure 6-7 Background information that is required by the ESS – part 1.

Air tightness of the building

Leakage air value n50 Pa (1/h):	3.5

User profiles and internal gains

Occupants (W/m²):	2			
Schedule	Begin	End	On factor	Other time factor
Workdays	0:00	23:00	0.6	0
Saturday	0:00	23:00	0.6	0
Sunday	0:00	23:00	0.6	0
Appliances (W/m²):	3			
Schedule	Begin	End	On factor	Other time factor
Workdays	0:00	23:00	0.6	0
Saturday	0:00	23:00	0.6	0
Sunday	0:00	23:00	0.6	0
Lighting (W/m²):	8			
Schedule	Begin	End	On factor	Other time factor
Workdays	0:00	23:00	0.1	0
Saturday	0:00	23:00	0.1	0
Sunday	0:00	23:00	0.1	0

Thermal capacity of the building	Medium

Hot water system

Total water consumption (l/person,day)	100
Share of hot water (-)	0,4
Hot water circulation pipe losses (kWh/m²,a)	20
Hot water temperature (°C)	57
Cold water temperature (°C)	7
Hot water heat recovery efficiency (-)	0

Energy production system

Efficiency of the heating system (-)	0,9
Efficiency of the hot water heating system (-)	0,9
Efficiency of the cooling system (-)	3,2

Figure 6-8 Background information that is required by the ESS – part 2.

Energy and water prices, operational costs

	Price (€/kWh)	Constant part (€/a)
Price of the heating energy	0,08	200
Price of the hot water heating energy	0,08	0
Price of the cooling energy	0,15	0
Price of the electric energy	0,15	100

Operational CO2-emissions

	Specific CO2-emission (g/kWh)
CO2-emission of the heating energy	270
CO2-emission of the hot water heating energy	270
CO2-emission of the cooling energy	0,15
CO2-emission of the electric energy	0,15

Figure 6-9 Background information that is required by the ESS – part 3.

The ESS covers small houses, blocks of flats and office buildings in Spain, Germany, Slovenia and Finland. To formulate the default values of background information, the house and buildings have been modelled to represent the typical technologies of age and type of house.

The identification of cost-optimal energy saving refurbishment methods is based on several sources, the most important of which are:

- the national valuations of cost-optimalization of energy performance requirements according to Commissions delegated regulation 244/2012 (comparative methodology framework for calculating cost optimal levels of minimum energy performance requirements for buildings and building elements).
- backgroung material concerning energy labelling of existing buildings.
- research concerning cost-optimal refubishment methods in Europe and individual countries (for example SUSREF project, within the 7th Framework Programme of the Commission, in which a methodology was developed to ensure the sustainability of the developed energy saving technologies in terms of environmental impacts, life cycle costs, social and cultural impacts).
- information collected from individual companies producing energy saving refurbishment methods.

6.3 Legislation

The methodology also supports to search, read and provide information that is important to understand when doing decisions about energy performance refurbishment. With regards to the information search services, the ESS provides read access to all information but also an edit mode. The methodology supports to read and provide information about regulations and incentives, renovation technologies, auditing and labelling, cost assessment and energy assessment (see *Figure 6-10*).

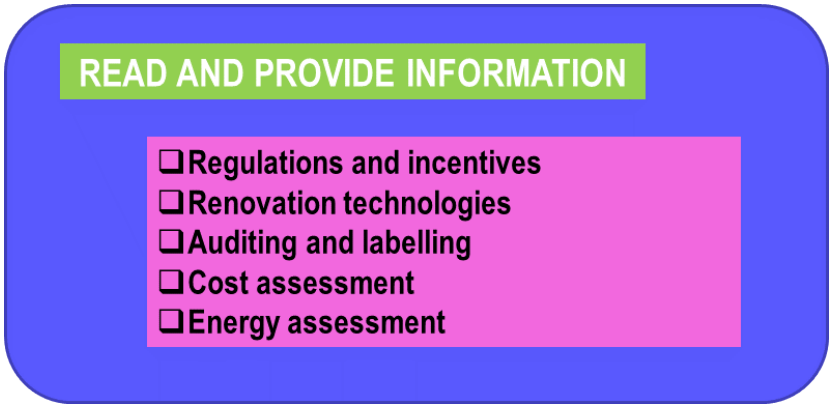


Figure 6-10: Areas of information supported by the methodology

The following table describes the structure of information supported by the methodology.

Table 6-1 Structure of information supported by the methodology

Regulations and incentives	
Regulations	Europe
	National
Incentives	Types of incentives
	Information on national bases

Energy consumption and savings	Assessment methods
	Standards
	Tools (availability, usability, access)
Costs and savings	Investment costs and savings in operational costs, LCC
	Cost optimum assessment
Carbon footprint savings	Carbon footprint of energy
	Carbon footprint of electricity and district heat on national bases
Auditing and certification	Inspection and examination
	Energy performance certificates, national
Technologies	Basic retrofitting technologies
	Nearly zero energy renovation
Procurement models	Project delivery systems
	Procurement strategy
	Contract models

7 Identification of a framework for a new Performance-based Business Model for energy-efficient building retrofitting

NewBEE Business models are mainly focusing on new business models and services for refurbishment of residential buildings. This covers single-units that are owner-occupied or rental real estates as well as multi-dwelling buildings owned by community associations or investors.

The NewBEE business model generator supports SMEs to identify business models (organizational models and financial models) for SME collaboration in the construction sector. SME networks addressed by NewBEE operate mainly in retrofitting buildings. In addition, the business model generator gives guidance to SMEs striving to optimize their current business model. The framework comprises of 3 different modules

1) NewBEE Business Model Framework
2) NewBEE Business Model Archetypes (organizational and financial models)
3) NewBEE Business Model Definition

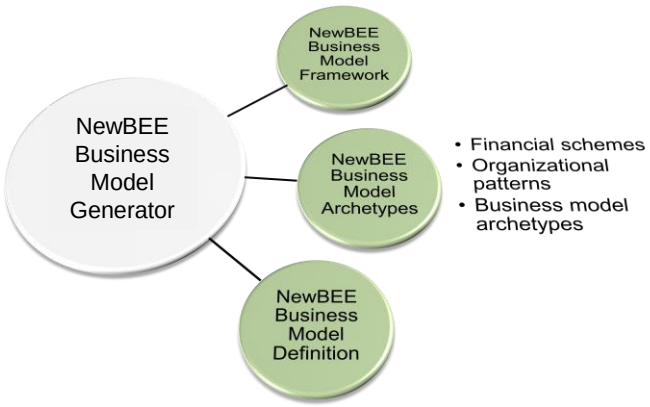


Figure 7-1 Structure of the NewBEE Business Model Generator

The three modules of the business model generator address three general-use cases that were identified for the NewBEE methodology.

- "NewBEE Business Model Framework" - An SME that wants to develop a new business model/update its business model (an SME receives guidance with the help of steps) (a list of questions has to be answered, certain steps have to be done)
- "NewBEE Business Model Archetype" - An SME searching for an idea of a good business concept / model (possibility to read success stories, cases)
- "NewBEE Business Model Definition" – An SME coordinator (or a group of SMEs leaded by one of them) that searches for a model for temporal collaboration (organizational model for the project)

The methodology, archetypes and approach for business model definition will be part of the NewBEE solution. It is envisaged to present the findings in the Collaborative Knowledge Management module by means of a semantic wiki to ensure that the information can be (country-specific) updated and presented in a structured manner.

7.1 NewBEE Business Model Framework

The NewBEE Business Model framework provides guidance (templates, etc.) for SMEs in the construction sector willing to review and optimize their business model or set-up a business model new to their company. The methodology is based on the Osterwalder Business Model Canvas[2, 3] and it enables SMEs to identify all important aspects leading to the concept for their future business model.

The NewBEE methodology covers external aspects (company environment) as well as company-internal aspects structured according to the Osterwalder Business Model Canvas. It is envisaged to provide a toolbox to companies that will together with a guided process enable them to tailor their new business model. The toolbox use also external sources providing a structured overview to the business model design topic.

Furthermore, the Business Model framework supports companies in defining their role and responsibilities within the virtual network. This covers not only their role and responsibilities for technical solutions or technologies during project execution but also their role and responsibilities concerning the collaboration in general (e.g. obligations for knowledge transfer, information transparency).

7.2 NewBEE Business Model Archetypes

This module presents different business model archetypes for retrofitting activities. Organizational models in the context of the NewBEE project specify collaboration patterns for the construction industry. On a first level, collaboration has to be distinguished into strategic and *ad-hoc* collaborations. Furthermore, on a more detailed level, different collaboration and partnering concepts can be defined as important for refurbishment projects (e.g. general contractors with claim management, construction management approach, private-public-partnerships). Partly they are traditional approaches for the project execution in the construction industry and some of them are new, life-cycle oriented approaches not implemented on a broad level in the construction industry. NewBEE will support construction companies to identify the appropriate (project-specific) organizational model and to describe their relationships to other stakeholders in the planning and execution stage of a refurbishment project.

The different organisational models and business cases are presented, with the help of a template, in the same manner, if possible, to ensure comparability. See in next figure an example using the proposed template:

Overview | Advantages/Disadvantages | Characteristics | Collaboration matrix | Value chain coverage [edit]

Characteristics	Main Application Area
Ownership of real estate:	✓ Private owner, ✓ Commercial owner(investors/funds), ✓ Housing companies(private/public..)
Size of property building type:	✓ 1-2 units, ✓ Commercial building
Retrofitting costs:	✓ <500k€, ✓ 500k€-1Mio€, ✓ >1Mio€
Time constraints:	✓ Important, ✓ Less important, ✗ Crucial
Project size:	✓ Small project, ✓ Large project, ✗ Fast-track project
Model type:	Project delivery system

Figure 7-2 Characteristics of an organisational model (example Bauen nach Smart)

[2] Osterwalder, Alexander (2004): The Business Model Ontology. A proposition a design science approach. Ph.D thesis. Universität Lausanne.

[3] Osterwalder, Alexander; Pigneur, Yves; Clark, Tim (2010): Business model generation. A handbook for visionaries, game changers, and challengers. Hoboken, NJ: Wiley.

After an overview description of the business model advantages and disadvantages as well as characteristics of the business model are summarized. Finally the description gives insight into the collaboration matrix and the value chain coverage (compare D4.2 and D4.3). Owners or professionals that search for a dedicated organisational model can analyse the different characteristics of the presented organisational models and identify models that fit e.g. to their project size or to their time constraints. The characteristics that support the owner were already presented in detail in D 4.2 and D 4.3 but repeated here. The image below shows a potential graphical visualisation in the NewBEE Collaborative Knowledge Repository (wiki style).

Additional information such as the value chain coverage give important information on the applicability of organizational models in each respective project context.

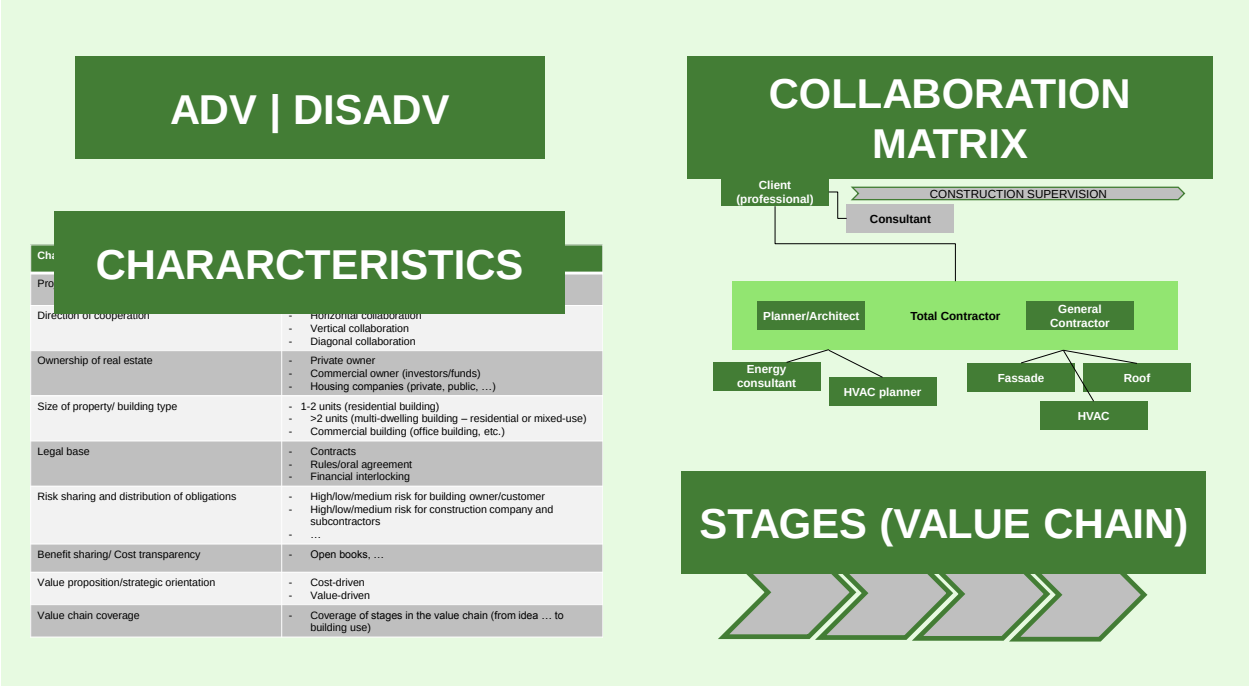


Figure 7-3 Template business model description

7.3 NewBEE Business Model Definition

The Business Model Definition enables SME networks to develop and tailor their business models according to their needs; the requirements of their customers / projects and related restrictions due to the applied technologies in the refurbishment project (see *Figure 7-4*).

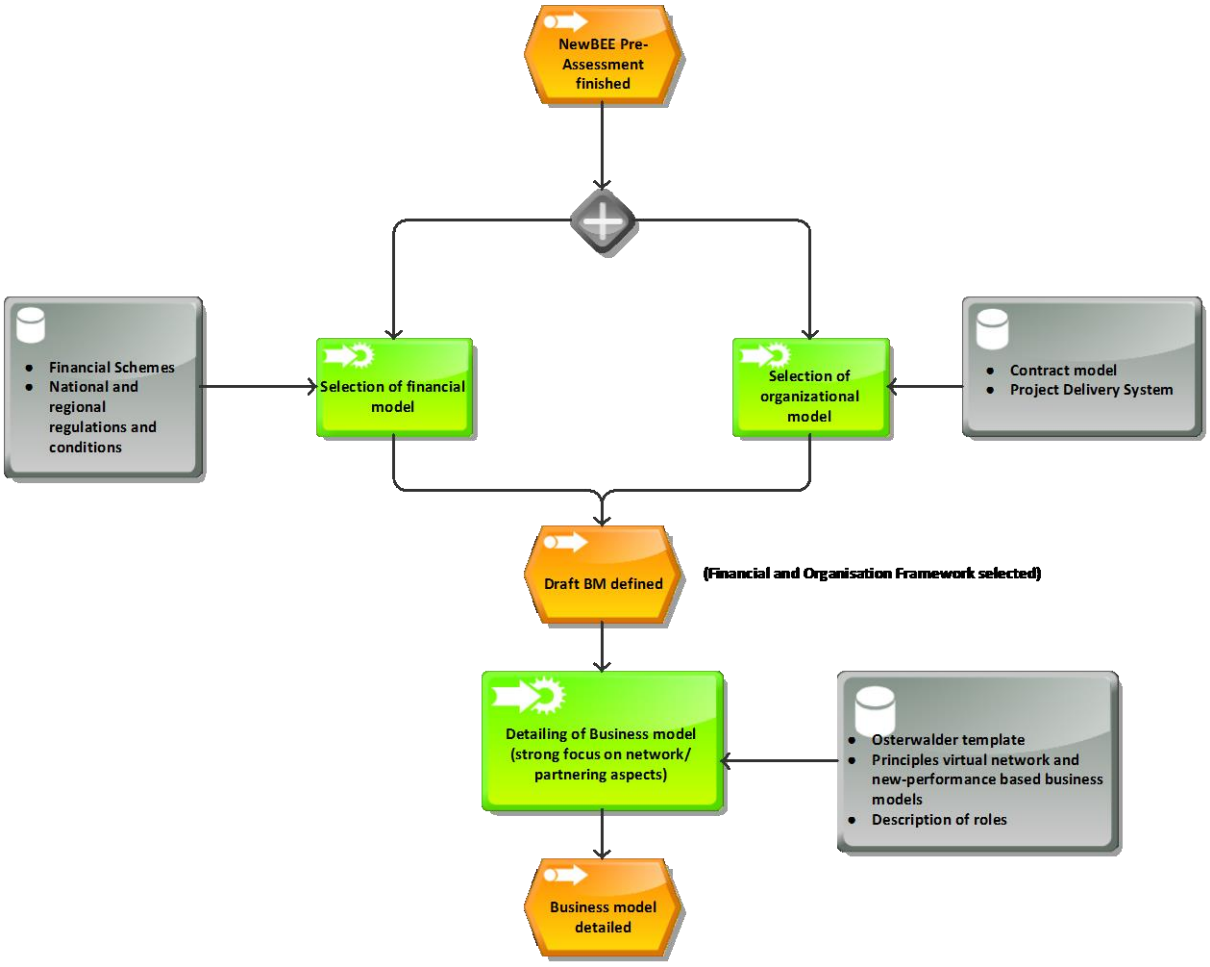


Figure 7-4 NewBEE Business Model Definition

Business model generation is influenced by different input parameters like:

- Client type
- Building type
- Retrofitting technology
- Available suppliers
- Etc.

As already defined in the Identification of a Business Opportunity module (chapter 5), based on these constraints, a dedicated financial and organizational model is selected and, if necessary, adapted towards the project-specific needs. The financial opportunities presented in D4.1 includes more typical financing mechanisms such as loans, grants, subsidies or complex financial instruments like Energy performance contracting. The selection of the most attractive financial model is depending on national regulations and sometimes also on regional funding.

The organisational model has to be defined in parallel but also in accordance to the financial model since the overall business model is defined by both interlocked components. In general the contract model and the project delivery system are defined but in accordance to the project requirements can be customized. E.g. contemporary interpretations of the general contractor approach provide support also in the use stage of the building which is beyond the archetype general contractor. After the first draft of the proposed business model is defined, the next step is the detailing of the business model. The approach described in the *Figure 7-4 NewBEE Business Model Definition* can be also applied if a company wants to update the business model or develops a new one. In general the approach is based on the Osterwalder business canvas and covers four main aspects: value proposition, customer, infrastructure incl. network and financial aspects.

However, due to the focus of NewBEE, a focus on design of the partner network and role concept for the project has been realized.

The companies receive guidance based on a questionnaire to determine the most important aspect of their business model and to visualize them by means of the Osterwalder Canvas. A tentative list of aspects that will be assessed by means of the questionnaire is presented below. The list will be reviewed and refined with the project partners and finalized in Q2/2015.

- Business model performance
- Business model efficiency
- Entry mode
- Acquisition of projects
- Degree of technological interweavement
- Project management
- Complementary assets and resources
- Competitive strategy
- Barriers to entry
- Power over suppliers
- Power over buyers
- Competitive advantage
- Human capital
- Investment into knowledge base
- Organizational adaption
- Degree of network competence

As already described earlier the definition of the partner network and roles within the partner network are highly relevant in the NewBEE context. In addition to a guided assessment by questions a visualisation of the relationships within the network seems an appropriate method for that. The detailing of the partner network could include the following aspects between customer, coordinator of the network and partners:

- Material flow between the different entities
- Capital flows and revenue streams
- Communication channel and information flows
- Type of relationship (contractual,etc.)

7.4 Energy savings performance contract (ESPC) model implemented by an Energy Service Company (ESCO)

Facility owners and operators know that energy costs are significant and that these costs can be reduced by investing in proven and cost energy saving technologies, systems and procedures. According to the *"D1.3 SME Driven Requirements Analysis"* there are a number of barriers before investing in energy conservation. Some lack technical knowledge; others lack adequate finances, or are unable to raise sufficient finances; while others have reservation about the ability of energy saving equipment to perform as promised.

Energy Performance Contracting (EPC) is when an Energy Service COmpany (ESCO) is engaged to improve the energy efficiency of a facility, with the guaranteed energy savings paying for the capital investment required to implement improvements. EPC allows building owners and managers to upgrade ageing and inefficient assets while recovering capital required for the upgrade directly from the energy savings guaranteed by ESCO. The ESCO takes the technical risk and guarantees the savings. The ESCO is usually paid a management fee out of these savings (if there are no savings, there is no payment) and is usually obligated to repay savings shortfalls over the life of the contract. At the end of the specific contract period the full benefits of the cost savings revert to the facility owner.

The methodology of EPC differs from traditional contracting, which is invariable price-driven. Performance contracting is results driven ensuring quality of performance. ESCOs search for efficiencies and performance reliability to deliver contractual guarantees.

An ESCO´s services typically include:

1. Performing an energy audit, known as a Detailed Facility Study (DFS)
2. Establishing baseline energy use for specific equipment, systems, or the facility as a whole
3. Designing the project in consultation with the customer
4. Undertaking turnkey supply, installation and commissioning of equipment
5. Training or briefing Customer personnel
6. Operating and maintaining the equipment for the life of the contract
7. Conducing measurement and verification (M&V) to determine actual savings and
8. Providing savings and equipment guarantees

7.4.1 Funding options

Funding is a critical part of any EPC and Customers generally understand that the energy savings are used to pay for the equipment and services provided by the ESCO. It is important to understand that paying for the investment from savings will depend on the total investment costs, the term of the contract, financing and the savings generated. If the cost of the Energy Conservation Measures (ECMs) installed under the contract is to be paid from savings, the accumulated saving over the life of the contract need to be equal to, or be greater than, the total cost of the project, including financing costs.

In any EPC project, there are basically three sources that can be used to fund an ESCO project:

- Direct financing provided from the balance sheet of the ESCO (rarely done)
- Third party financing; leveraged by the ESCO equipment suppliers, or leasing firms or
- Direct financing by the customer using traditional sources of project funds.

7.4.2 Detailed Facility Study (DFS)

It is a contract between the Customer and the ESCO. The Detailed Facility Study (DFS) agreement places condition on the ESCO in order to plan for and control the scope of the project. Negotiating and signing a DFS agreement and undertaking a DFS involves:

- Negotiating the scope of the DFS
- Establishing the minimum acceptable technical and financial criteria
- Establishing the timeframe for the study
- Signing the DFS agreement
- Undertaking the DFS

A DFS is required to:

- Identify energy (and related) cost saving measures for implementation.
- Define the scope of work to be undertaken to achieve the cost savings.
- Identify the costs, to investment grade level, for implementation of the scope (i.e. develop the final costs in sufficient detail, subject to negotiation, for an EPC to be signed).
- Identify performance levels (including estimated savings level) and guarantees to be provided by the ESCO.
- Identify the measurement and verification procedures so that savings can be demonstrated over the life of the EPC.

The ESCO Business Model uses the DFS agreement which provides documents, outcomes and results of the following:

- A detailed description of the equipment and energy systems in place at the premises, their condition at the time of the DFS, and methods of operation.

- The energy consumption and demand profile and the space conditions of the facilities on the premises.
- A description of the ECMs and improvements proposed by the ESCO, the cost of installation of the ECMs and improvements, the projected IPR for each site on the premised and the impact of the proposed ECMs and improvements on the energy consumption and demand profile of each site on the premises and the impact of the proposed ECMs and improvements on the energy consumption and demand profile of each site and on the space conditions of the facilities on the premises.
- A brief description of the intended purpose of each of the modifications proposed by the ESCO to the equipment or systems and/or to the operating methods of the equipment or systems.
- A projection as to any changes in capacity of the existing equipment due to the modifications, or improvements contemplated.
- An outline of training programs or instruction required for the Customer´s facilities managers and operators, and a summary of the involvement of facilities managers and operates likely to be necessary to effect the improvements.
- Estimated figures projected as the annual energy savings, which will result from the modifications or improvements, together with an indication of how these figures are arrived at, with performance criteria defined in terms of lumen, liters/sec air temp etc.
- A summary of the intended schedule for implementing the modifications and improvements, including the timing and estimated duration of on-site work in respect of each distinct location or facility.
- An indication of any altered or new operating or maintenance requirements that will apply due to the implementation of the improvements, and an estimate of the cost of any upgrading or maintenance work that the ESCO recommends be undertaken prior to, or during the implementation of the modifications/improvements to maximize their effect.
- A full description of all new equipment to be installed to effect the improvements together with an estimate of the expected lifetime of that new equipment.

Two significant potential barriers in negotiating an EPC are:

- The potential up-front costs associated with defining the project when the outcomes are unknown or unconfirmed; and
- Obtaining a commitment to proceed from the project development phase (including the DFS) to contract negotiation and implementation.

DFS Financial conditions: The most important aspect of the DFS agreement is establishing the necessary conditions to ensure flexibility:

- Maximum project costs for implementation of the proposed ECMs. It should be applied to the entire project over the life cycle.
- Minimum total identified projected energy savings. It defines the minimum project energy savings from the proposed project over the term of the proposed EPC. This value is established through preliminary discussions with ESCOs, or the preliminary proposal of the selected ESCO.
- Minimum total Internal Rate of Return (IRR) in respect of all services provided over a defined number of years. This value is intended to represent the minimum criteria for financial viability.

7.4.3 Measurements and Verification Plan (MVP)

The requirements to fully describe a Measurements and Verification Plan (MVP) are based on the fact that energy savings cannot be directly measured. Energy savings are determined through an indirect process, by comparing pre-retrofitting (or baseline) energy consumption with post retrofitting (or actual) energy consumption. The difficulty with this is that it is rare for all conditions to remain constant over the term of an EPC. Consequently, adjustment factors are introduced into calculations procedures. These factors are applied to the pre- retrofitting energy consumption to estimate what would have been the energy consumption of the Energy Conservation Measures (ECMs) had the same conditions been presented throughout the full term of the EPC. This dynamic process is repeated (typically) on each

annual audit and report of the Measurement and Verification (M&V) performed by the ESCO to demonstrate the savings:

1. Measuring energy use before and after ECM installation.
2. Verifying that the ECMs continue to perform and generate savings.
3. Quantifying the energy savings by comparing before and after energy use.
4. Using the data to identify potential increasing in savings either to reduce risk, or improve returns (improved returns in the case of a shared savings component to the excess savings, or a shared saving contract).

The contracting perspective uses M&V as a:

1. Tool for defining and controlling risk (ESCO´s view);
2. Control for uncertainly about savings (has the guaranteed savings amount been achieved); and
3. Basis for payments (shortfalls, excesses and shared savings).

7.4.4 ESCOs Business Model based on ACCIONA Company

Value

- The main value proposition with the customer is the reduction of the cost of energy bills. This reduction will be possible for the improvement of the energy behavior of the buildings due to both passive (materials and architectural issues) and active (facilities) refurbishment.
- Improve the buildings conditions increases the value of the building and the comforts of its tenants.
- The support in financial resources (direct or through the financial companies linked to the construction company): in addition, the customer will reduce its energy bill while he interacts with only one service provider.
- The customized service with a reliable company ensures that the compliance of the regulations and the energetic operation of the building during the life of the contract will be done carefully.

Customer Segments

- The targeted customer will be the owners of the building, independently to the sector that they belong.

Customer Relationships

- The relationships with the clients will be personalized for two reasons: firstly, the importance of the client target and, secondly, because these kinds of projects need a huge investment; for this reason it is necessary that all parts require having a long-term commitment. In this business there are no clients but partners.

Channels

- Direct:
    - Sales force. It is necessary to have a sales force that allows offering the services of the ESCO through a wide networking. The sales force will be divided depending on the type of client.
    - Tenders. There are different tenders from the public and private sector whose main target is to hire a company that improves the energy behavior of different buildings. This is a common way to get clients, and for this reason the proposals must be perfect in each aspect (technical, budget, legal, etc.).
- Indirect:
    - The Indirect channels will be different partners and companies that take part in a refurbishment project. Potential channels are: architects, engineers, building companies

and others who are related to construction clusters. For this reason it is important to create a network into this cluster.

Key Partners

- Architects. Nowadays, the holding has important and well knowing relationships with different architects which are necessary to maintain because of the important role they play as brand advocates. At the same time, in the future it is necessary to increase the bulk.
- Financial institutions. The banks and the financial institutions have one of the most relevant roles in this business model. The building will need big investments for improving its energy behavior and clients will need finance credit facilities, so it will be crucial to have excellent relations with different financial institutions.
- Equipment and materials suppliers. It will be necessary to establish strong relationships with these companies for ensuring compliance in the supply but without having exclusivity to anyone.
- Governmental entities. These institutions determine the regulations and they will be one of the most important clients. It will be absolutely necessary to keep the best relation with them.

Key Activities

- Sales implementation strategy. The strategy for catching and maintaining the value is one of the most important works. For this reason it is necessary to design it carefully with the aim to innovate but always take into account the strategy. In this activity it is important to create a network of contacts that perhaps will be potential clients and keep constantly updated with developments in the market.
- Previous audit/tendering preparation. These technical works have to be done carefully because one mistake in some of them would cause a difference between profits and losses.
- Refurbishment works/commissioning and operation/cost control. These works are critical and have to be done well to ensure the future Return On Investment (ROI).
- Financial planning. This activity will be determinant in obtaining financial resources. It will do a sensitivity analysis of financial projections for analyzing the variations of different scenarios.

Key Resources

- Financial. Despite necessarily relying on financial entities as key partners, the financial resources for supporting the structure is necessary to take into account. Without this support it is difficult to generate confidence in the financial institutions.
- Human. The people with specific expertise (technical, management, etc.) for developing the different stages of the projects will be the most important resource.
- Brand. The brand is an important resource since it is one of the most recognized companies in the field of renewable energy and sustainability in the world.
- Technical resources. It will be necessary to have special resources to carry out works in the different stages of the projects.

Cost structure

- The cost structure is the main charge. It includes personal costs (technicians, sales force and administrations). Other costs that should be kept in mind at the beginning are related to some equipment. Variable costs will be considered as support costs for legal and insurance assistance.

Revenue Streams

- The revenue streams come from a fix fee that will be a percentage of energy consumption savings that will be reflected in the energy bill. During the first few years the total percentage of savings will be used for paying the inversion during the refurbishment of the building. After this, the percentage will be shared by the owner and ESCO according to the contract specifications.

Other factors

- The main barriers for doing the business are to obtain financial capacity through banks or own resources, and to have access to an adequate group of clients with capacity to sign contracts. Main threats are big changes in the energy regulations from both a national and European point of view. It is important to know that it is a cyclical business and in crisis periods this is not a priority to potential clients. The success will depend on anticipating the threats and will be able to be excellent in both technical and management aspects. It is included to choose the appropriate clients and manage the financial aspects.

8 Collaborative Knowledge Management

Construction industry is a sector with a strong potential for knowledge sharing across the Collaborative Networks and therefore the methods and procedures assuring such an efficient knowledge sharing i.e. efficient knowledge management are to be carefully addressed for achieving an efficient collaboration between the actors in the retrofitting projects.

Methods and procedures for Collaborative Knowledge Management (CKM) to be applied in NewBEE enable collecting and storing of data/information, processing it into knowledge, facilitating later knowledge reuse, sharing common resources using online shared directories (e-Library), and finding annotated resources through normal and advanced search.

The NewBEE methodology describes the general methods and procedures applied for knowledge management and points out the specifics related to the collaborative networks.

The different methods for knowledge acquisition/collection, structuring, and storing for optimal reuse will be described in this methodological block.

8.1 Knowledge acquisition from different sources

Knowledge collecting ways which are to be elaborated in the methodology described including:

- Knowledge collection from experts;
- Knowledge collection from documents/existing data bases;
- Gathering of the knowledge created along the projects.

The NewBEE methodology allows for updates regarding the new knowledge sources such as e.g. multimedia sources.

8.2 Knowledge structuring, storing and sharing

The knowledge structuring approaches in the NewBEE methodology are:

- Knowledge structuring according to the expertise domain, including for example
  - Energy auditing and efficiency assessment,
  - Building typologies,
  - Energy saving potentials identification/determination,
  - Retrofitting technologies for walls/facades, windows, lightning,
  - European/ national best practices,
  - European/ national legislation,
  - Retrofitting financing (grants, loans, ESCO).
- Knowledge source nature, including
  - Documents in different formats (doc, pdf, ppt,)
  - Databases
  - Web pages
- Other ways, to be identified along the project.

For structureing and storeing the knowledge, the following systems have been used:

- A database management system based on a relational model.
  1. Data has been stored and presented as relations, i.e., tables that have relationships with each other, e.g., primary/foreign keys.
  2. To manipulate the data stored in tables, a system should provide relational operators - code that enables the relationship to be tested.
- A wiki structured by different documents which are connected by hyperlinks. Wiki supports hyperlinks and has simple text syntax for creating new pages and crosslinks between internal pages on the fly.

- Whenever possible a tagging method for organizing information will be applied: together with the classical hierarchical organization, some content can be associated to specific set of words called tags; the generation of tag-clouds helps NewBEE users to easily discover content related to same subject.

9 Organisational / Human issues in a Virtual Breeding Environment

NewBEE methodology does not only support the technological development of the system, but also covers the organisational part of the system. This chapter about methodology explains how to organise collaboration among actors in the Building sector within the VBE in order to assure optimal business models for energy retrofitting process, addressing also new services enabled by such collaborative design approach.

2.5.1 Restrictions and limitations of collaboration: Motivation

People naturally seek to give meaning to their relationships and to what they think about and do. Performance becomes more motivated when meaning is found in one's aims. The fact is that searching for a fuller, more transcendental meaning than the immediate result is a very important trigger for motivation. If an objective is shared, then it becomes a force for bringing a group of people together and for integrating them into a common project. The objective of NewBEE is clear: to boost the SMEs retrofitting business in Europe by creating a collaborative working environment among SMEs and a meeting offering place for building owners where they can find the required services to retrofit their properties.

Therefore motivate SMEs and building owners are one of the most important issues for the NewBEE success. Strategies to motivate the SMEs not only to become NewBEE members but also to cooperate and collaborate in the NewBEE Collaborative Working Environment will be required. Motivation strategies will be also designed to engage the building owners to became members of the NewBEE environment and use the services provided by the NewBEE, mainly the call for proposals to generate Business Opportunities for the SMEs members.

The strategies that will be used to motivate the SMEs and the owners to use the NewBEE services are:

- Provide information accurate and frequently updated
- Marketing strategies oriented to owners
- Marketing strategies oriented to SMEs
- Ranking the partners

Provide information accurate and frequently updated

This strategy is mainly focused on building owner, and therefore specific attention will be paid to the provision of content for educating building users on efficient energy use.

The Collaborative knowledge Repository (wiki based content) will deliver simple but extensive information about retrofitting in order to move the building owner forward to his own retrofitting project. Information is supposed to help building owners for selection of both optimal technologies and the most suitable SME's expertise.

The owner has to be attracted by the free NewBEE services when he is first considering to retrofitting his home. The quality and reliability of the information provided by NewBEE will be critical to attract his interest, maintain him investigating on technologies, tentative cost, sources of financing the project, expected return on investment and so on. If NewBEE success on this first step, the user most probably will go a step further asking for professional advice or directly calling for proposals.

An indicator of the success of this strategy would be the number of call for proposals sent by the registered owners.

Marketing strategies oriented to owners

Marketing can significantly support building owners in their decision whether to retrofit. NewBEE will have to support creating awareness of benefits of energy efficient retrofitting of the built stock, taking into account different financing opportunities.

The marketing strategies should include identification of the target audience, the scope of the campaign and definition of the objectives to be taken into account. The identification of the most suitable communication strategies will assure an appropriate coverage and impact to determine e.g. who is the most likely to be receptive to an energy saving program, how to motivate the possible customers.

Marketing strategies oriented to SMEs

Marketing strategies to attract SMEs into NewBEE collaborative environment is also crucial. NewBEE requires a well-balanced ecosystem of SMEs capable of covering all the services provided by main contractors and compete with it in quality and price. This is only possible with a database of SMEs, so marketing strategies will be designed to motivate SMEs to become member of NewBEE system.

Marketing strategies can be also considered by the SMEs to promote themselves inside the NewBEE platform.

NewBEE also y creation tool should also enable companies that use the NewBEE platform for business purpose to promote themselves. The NewBEE platform should support companies in marketing activities that are beyond the traditional channels and concepts used in the construction industry.

Ranking the partners

In addition to the marketing strategies, NewBEE will provide a ranking system that will enable transparency regarding the quality of work done by respective SMEs, and ensure that only companies with high reputation forming the leading edge in their business area will collaborate via the NewBEE platform.

Such a ranking will consist of a punctuation made to each one of the SMEs based on an algorithm that will take into account:

- Number of collaborative projects in which the organization have participated.
- The punctuation made (cross punctuation) by each one of the members involved in the collaborative space (included the building owner), after finalising the retrofitting project.
- Valuation of the technologies that the organization is capable of implementing and, where applicable, the success in the implementation and in the responsibility of the organization when collaborating as part of a consortium including the agreements made.

The ranking system will motivate the SMEs to get involved in an increasing number of collaborative projects, to improve the quality of their collaborations and services and focus on those services that really add value in the retrofitting chain with the SMEs that usually collaborate.

2.5.2 Intellectual Property Rights (IPR)

One of the goals of a collaborative environment is to foster knowledge sharing among participants. However, while knowledge is meant to be shared, its owner shall be allowed to retain his or her intellectual property rights. It emerges the need for a set of ICT tools, which are able to address this issue pervasively and horizontally in the several services and activities composing NewBEE system. The features of these tools comprise:

- Automatic tracking and tracing of collaboration, which will capture and manage the collaboration patterns logs.
- Owning facilities, which identify the owner of messages or documents.

Organisations collaborating in an Extended Enterprise environment have to be aware that they are sharing data, documents, information and knowledge outside the boundaries of their enter-prises and this knowledge may be protected under Intellectual Property Rights (IPR).

This section of the methodology contains methods and recommendations to take care of Intellectual Property Rights for collaboration between companies at Extended Enterprise level. A clearly specified domain of collaboration between companies when acting at the Extended Enterprise collaboration level must be defined in a formal collaboration agreement, as a support for the aforementioned tracking and owning facilities. This includes the safeguarding of certain intellectual rights as well as respecting the best practices in collaboration issues. For achieving this, confidentiality agreements guarantee an organisation that its information, which is about to be made available to another organisation, will not be revealed to third parties and will possibly be returned to it at the end of the work process.

It will depend of the kind of privileges selected previously to start working in the Collaborative Space.

The scope is to provide adequate protection regarding the IPRs used in or generated during collaboration, by considering Background and Background rights, Foreground and Confidential information. The protection provisions will be structured according to the main roles involved in collaboration.

The usual structure for a collaboration agreement must contain the following points, briefly explained:

2.5.2.1 Identifying the parties

The agreement has to make the parties which are bound by the confidentiality obligation clearly identifiable.

2.5.2.2 Statement of reasons

A short paragraph can be useful in order to define the context in which the information will be disclosed, and the reasons behind the parties' wish to communicate the information as the subject of a contract.

2.5.2.3 Definitions

A list containing a definition of the terms, which will be used in the remainder of the contract can facilitate a more precise interpretation of both the contract and the parties' intentions.

2.5.2.4 Subject

It is necessary to describe the subject of the agreement, since this is a factor that determines the type of contract.

2.5.2.5 Disclosed Information

In certain cases, information or know-how that will be the subject of a confidentiality obligation is not (or not yet) protected by intellectual property. In such a case, allowing the disclosure of non-patented inventions, know-how, ideas or concepts etc., to third parties would very often invalidate the owner's efforts to obtain such protection. It is necessary to be able to identify the information or know-how which is the subject of the confidentiality agreement.

2.5.2.6 Exceptions

It is necessary to limit the scope of the confidentiality agreement by determining the information which is not covered by its obligations.

2.5.2.7 Use of Information

It is important to determine the operating conditions in the agreement to enable parties to check the use of disclosed information..

2.5.2.8 Permissible disclosure of confidential information

The parties can agree on persons, to whom information will be disclosed, for example by naming them directly or by designating one or more of the recipient's services, possible subcontractors, subsidiary companies, holding company and partners. If the above case arises, it may be useful to oblige the recipient to have these persons sign confidentiality clauses reiterating the terms of the confidentiality agreement.

2.5.2.9 Disclaimer

The owner can renounce liability for any damage to the recipient resulting from the use of erroneous or incomplete confidential information or data.

2.5.2.10 Reserving Intellectual Property Rights

In order to avoid any misunderstanding, it can be useful to specify that no IPR, copyright on the provided documents, or possible patent rights on the revealed invention, are conferred to the recipient. The disclosure of information does not lead to the legal conferring or granting of rights, unless provision is expressly made for this.

2.5.2.11 Term of Confidentiality Agreement

The term of the confidentiality agreement has to be mentioned either in the form of a date (e.g. on 31 December 2013), a period of time (e.g. 10 years from the conclusion of the confidentiality agreement) or a time limit (e.g. 5 years after whenever the project concerned ends).

10 Conclusions

The goal of this deliverable is to describe the final version of NewBEE methodology, which has been elaborated after the NewBEE Methodology Concept defined in Chapter 4 of “D3.3 Overall NewBEE Concept” and Methodology Specification defined in “D3.1 NewBEE Specification”. It has served as input for this deliverable which has been developed by taking into account also the research made in the previous deliverables/previous work packages.

The methodological approach presented in this deliverable provides a comprehensive systematic manner on how to combine the functionalities of the NewBEE System so as to create the Collaborative Working Environment, aimed at identification of Business Opportunities.

Thus, NewBEE Methodology provides a general approach on how to create a collaborative network when a Business Opportunity is identified. This methodology identifies all the information needed to transform the BO into a real collaborative project. It describes the steps needed to evaluate a business opportunity in terms of needed expertise, resources and profitability and subsequently to set-up a Virtual Collaborative Network fitting the initial requirements of the planned project. It addresses the organization of collaboration among actors in the building sector within the VBE in order to assure optimal business models for an energy-efficient retrofitting process, addressing also new services enabled by such collaborative process approach.

The Energy Efficient Services have been developed to answer to a business opportunity identified within the NewBEE System where the detailed (professional) cost-benefit balance is calculated for each of the selected retrofitting technology.

The NewBEE methodology has instantiated a generic approach in analyzing the important factors for reaching the final target of identifying an optimal business model for a specific project on energy efficient building(s) retrofitting. It has identified a framework for performance-based Business Models which fit that specific energy-efficient building retrofitting project. It identifies all the components of a BM based on the Osterwalder’s approach and maps these components to the specific NewBEE context. Also, an optimal business model based on Energy Service Companies (ESCOs) best practices has been documented explaining; Energy savings performance contract (ESPC) model implemented by an ESCO.

The NewBEE methodology has described the Collaborative Knowledge Management methods needed for acquiring, structuring, storing and using of the information inside the NewBEE collaborative environment

NewBEE methodology should be tested with the implementation of NewBEE system in the four business cases. Integration and Testing activities should be carried out considering NewBEE as a platform that could be used to develop new energy retrofitting initiatives, improve critical processes and create a possibility to study improvements linked to Collaborative partners’ joint needs, objectives, under energy retrofitting perspective.

Moreover, the NewBEE methodology supports the coordination and development of NewBEE ICT System and its integration. It will transform NewBEE ICT platform into a powerful system for construction practitioners to successfully examine processes, create new ones, improve them and measure the results in order to generate information (knowledge) that will be useful to share with other partners in certain conditions so as to make it possible to grow together. In this regard, NewBEE system will help developing projects and consortiums and will save time to other communities that would come up with similar dilemmas.