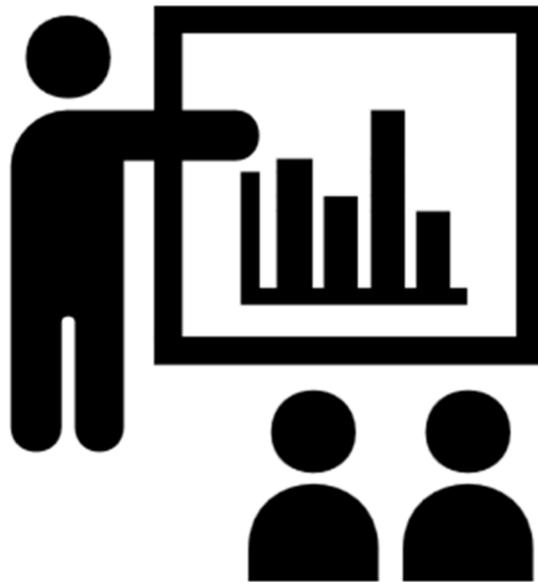


D5.1: Typology canvas of business models



COST REDUCTION AND MARKET ACCELERATION FOR VIABLE NEARLY ZERO- ENERGY BUILDINGS

Effective processes, robust solutions, new business models and reliable life cycle costs, supporting user engagement and investors' confidence towards net zero balance.

CRAVEzero - Grant Agreement No. 741223
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Framework Programme of the European Union



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D5.1: Typology canvas of business models

Authors:

Arnulf Dinkel¹, Benjamin Köhler¹, Anneke Quast¹

Contributors:

Lea Kießling¹, Annalisa Andaloro², Gerold Köhler³, Thomas Stöcker³

¹Fraunhofer Institute for Solar Energy Systems ISE, Heidenhofstraße 2, 79110 Freiburg, Germany

²eurac research, Via A. Volta 13/A, 39100 Bozen/Bolzano, Italy

³Köhler&Meinzer GmbH, Junkersring 14, 76344 Eggenstein-Leopoldshafen, Germany

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FOREWORD

This report summarizes activities and results of Workpackage 5 nZEB Business Models of the Horizon2020 CRAVEzero project.

A good starting point to get an overview of nZEB business models (BMs) is Figure 1. It gives an impression of the most relevant stakeholders in the different steps of a building's life cycle. In order to promote the nZEB market win-win situations for the stakeholders in each life cycle phase should be translated into business models. Stakeholders have been invited to round table discussions and asked for their preferred business idea and the relevant

framework conditions. CRAVEzero evaluates existing business models in several EU countries, at least from the biggest markets, taking into account regional particularities. All stakeholders are to be considered, ranging from municipalities to end users and building occupants. Each group of stakeholders should be able to define (or be aware of) business models for low LCC nZEBs that propose profitable situations and benefits for themselves.

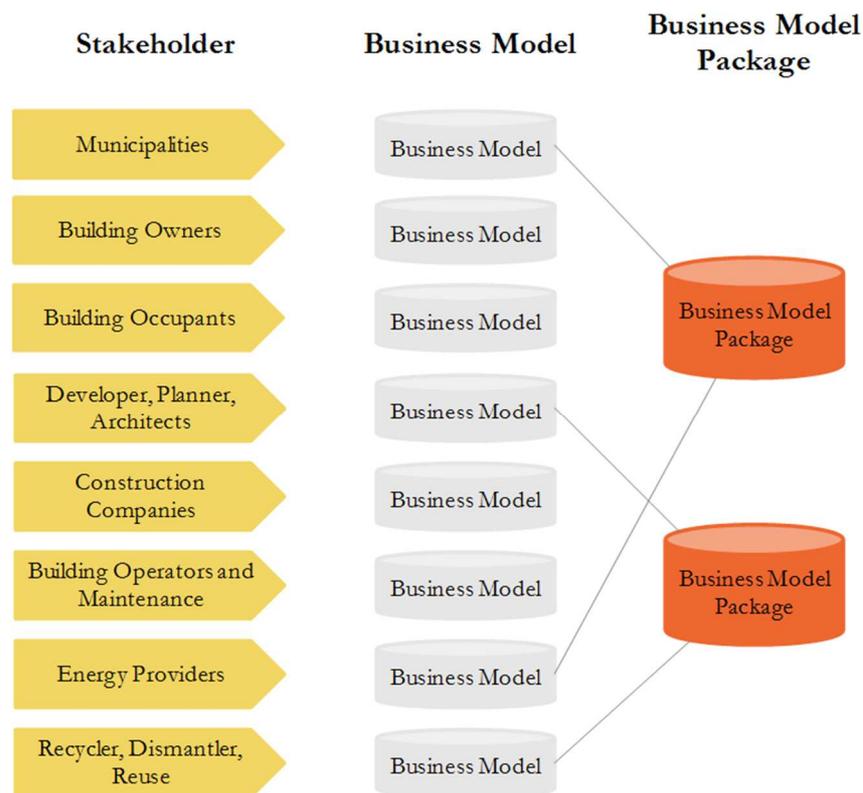


Figure 1: Business model overview (source: Fraunhofer ISE)

A range of business models to be developed in CRAVEzero considers technologies as well as planning and construction process, thus affecting requirements regarding technologies, planning and

construction. The business models create answers to the key questions: Who are your customers? What are their needs? What do we offer? Value propositions to serve customer problems and satis-

fy customer needs (in terms of performance, customization, speed, comfort, design, and price) were defined. It is conceivable that stakeholders can either be a provider of a service or customer or both.

Robust business models are needed in order to provide reliable information on the costs & benefits that an investor and all involved stakeholders can have in the building process for a low LCC nZEB. This allows also reducing the uncertainties that impede the wide investments. Costs and benefits

can be shifted from the investment phase to the operational or other phases. The business models consider not only economic aspects but take into account also energy, environmental and social aspects. Furthermore, a comprehensive analysis of possible subsidies and financial mechanisms (pros and cons) will be carried out. The models address all involved stakeholders during the life cycle of the building and are able to generate win-win situations by increasing confidence and reliability.

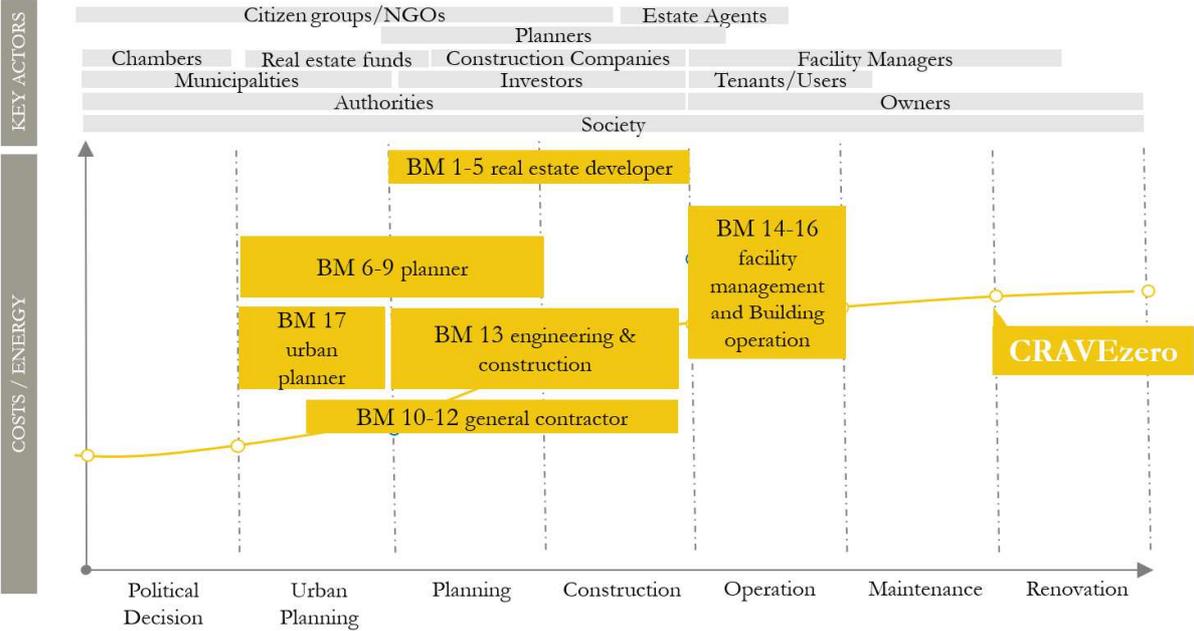


Figure 2: Business models and CRAVEzero overall approach (source: Fraunhofer ISE)

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EXECUTIVE SUMMARY

This report features a method to analyze business models related to nZEBs, which has been developed together with the involved partners. The project partners used this method to describe their own business models and validate them. A challenge for all partners was the description of revenue streams and costs. The business models from the project partners are sometimes related to the provided case studies. One lesson was that the business models for low LCC nZEBs are often embedded into the “normal” business approach and it seems difficult to separate the nZEB business approach from the “normal” business approach especially regarding costs and revenues.

However, through the described methodology and the incorporated attractiveness portfolio tool, it is possible to assess business models.

In total, 17 Business Models (BM) are analysed and described mainly based on the Business

Model Canvas. The BMs have different stakeholder perspectives, namely:

- Real Estate Developers,
- Planners,
- General Contractors,
- Engineering and Construction,
- FM/ Building Operator and
- Urban Planner.

Thereby they are also related to different stages in a building’s life cycle.

With the applied method critical success factors (strengths and key factors) for nZEB related Business Models were identified (see Figure 3 and Figure 4). Key strengths, which are essential in several provided models, are the “Guarantee on Comfort and Performance”, “Valuable Project Management”, Cost Reduction/ Guarantee of Costs” and “Human Expertise and Experience”. “Competences/ Know-how / Experiences” was identified as the key factor for realising cost efficient nZEBs.

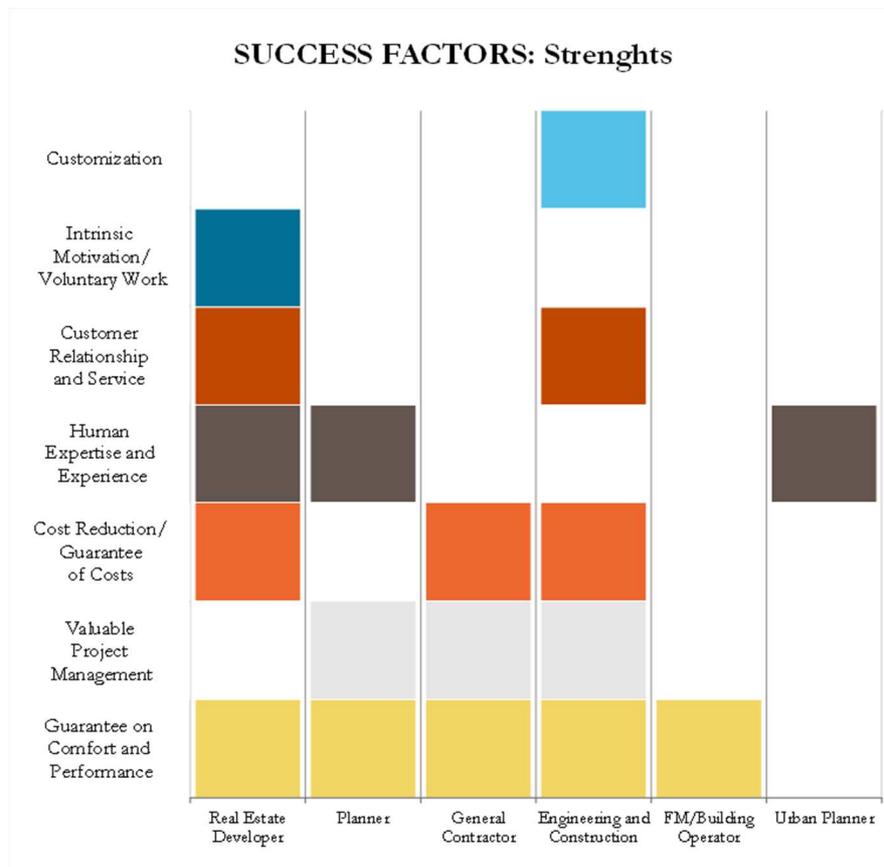


Figure 3: Cross-Analysis of BMs' strengths

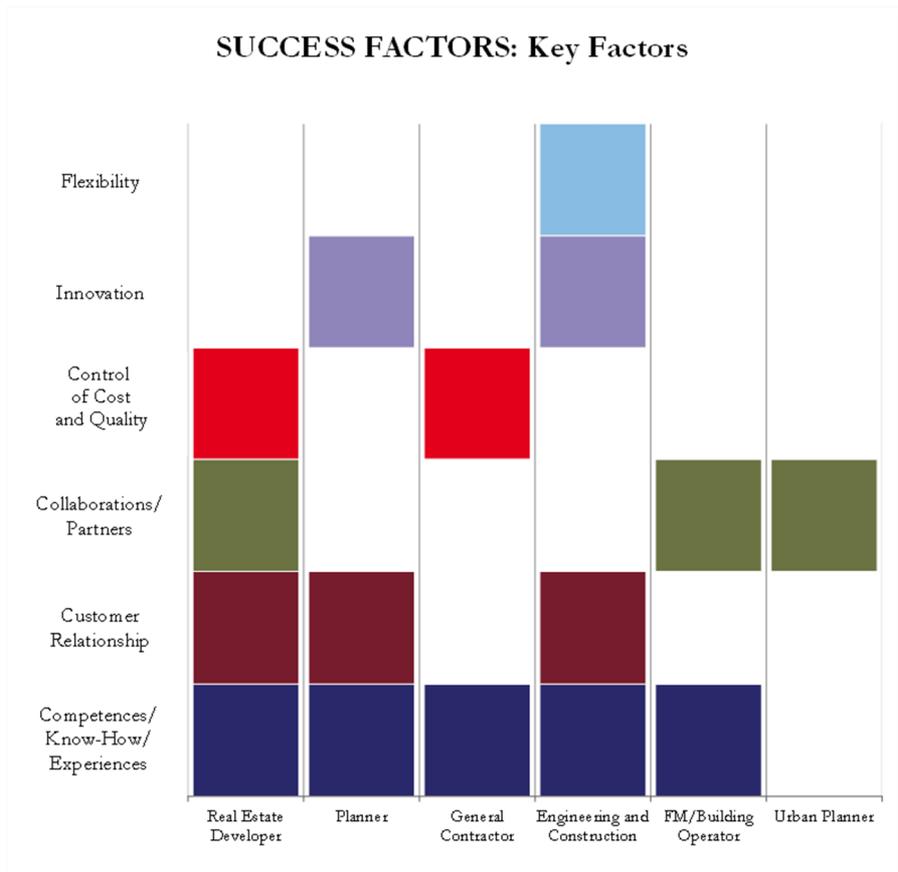


Figure 4: Cross-Analysis of BMs' key factors

In the following chapters the developed methodology and the different necessary steps and tools are briefly described. Furthermore, the different collected BMs are clustered (according to stakeholder perspective) and their major characteristics according to the Business Model Canvas are provided and compared with each other.

Thereby critical success factors and the attractiveness of the analysed BMs are identified and rated. A detailed description of the developed evaluation method will be published in an additional paper.

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INTRODUCTION

The goal was to develop an operative methodology to achieve the best conditions towards cost optimal nZEBs exploring the concept of integrating nZEB-technologies and business models in the whole planning, construction and operation process.

The evaluation and generation of enhanced and innovative business models are also part of the study of nZEBs. In order to generate new business models, it is necessary to identify what types of different business models already exist in the markets and what makes them successful or inconsistent. Therefore, in contrast to studies that have been conducted before, the focus is not only on general business models in the building and energy sector but also on concrete examples delivered from industry partners of CRAVEzero. The results of the evaluation are the basis for the generation of new models that are not only theoretically interest-

ing but contain valuable knowledge and information about existing and tested business models.

Therefore, another result of this report is the development of a method that allows for a holistic evaluation of business models. Hereby, both quantitative and qualitative variables are considered. It enables involved and interested companies to analyze their proposed business model in order to see whether it is success promising and which steps need to be taken in order to enhance it.

In this report the collected business models of the CRAVEzero project partners are described. Cross-comparisons of their strengths and key factors are conducted in order to identify repetitive patterns and differences for various stakeholder perspectives and regions. A detailed description of the developed evaluation method including steps that are not described in this paper will be published in a separate document.

1.1. OBJECTIVE

There are many different business models and often they are closely linked to existing market structures, to a single stakeholder in the process and to policies. In other words, business models are often country, stakeholder and context specific. Within WP 5 several steps will be developed. In a first step an inventory of different existing business models is made, considering: (i) the CRAVEzero case studies, (ii) the approach in the participating countries and (iii) global examples of successful case stories. Co-operative strategies are those, where different stakeholders bundle their expertise's to create positive outcomes, creating synergies and 'win-win' cross company boundaries. Already existing and

new examples for 'Win-win-win' nZEB business show advantages to different types of stakeholders, for example, planners, developers, construction companies and users, while positively contributing to the environment and society. It was analyzed which business models exist in the major markets. In a next step, this knowledge can be applied to help create a mass market for nZEBs. This will be achieved through the co-creation of potential effective business models and services with national stakeholders, accompanied by the definition of guidelines for policymakers to allow for a more effective up-scaling of proven business models and services.

1.2. TASKS

In order to achieve the best possible results, this work has been divided into two general tasks:

Task 5.1: Identify potential for ‘Win-win-win’ sustainable business for all involved stakeholders according to the process in WP3 (Result 7)

- Comparative analysis of current European business models for nZEBs and their frameworks/ecosystems with a clear focus on quantifying and qualifying effectiveness. Identification of stakeholders (policymakers in the field, end-user representatives, collectives, SME suppliers and receivers of energy services, academia, business developers, consultants, technology developers and NGOs in the field) for proven nZEB business models.
- Analysis on how the different parameters of success of business models and services relate to each other, regarding economic profitability, scale of impact and real savings, business creation, growth rate, synergies with other values, adoption rate etc.
- In-depth comparative analysis of similar business models in different countries, determining patterns, drivers, and pitfalls.
- Identification of key factors that make business models succeed in the participating countries through an in-depth analysis of country specific markets and policies for energy services and their influences on business models
- Identification of market uptake potential for nZEB buildings in the biggest markets in Europe: Germany, UK, France, Italy and Spain; and considering the major regions, for example: Northern and Western Europe, Southern Europe, and Eastern Europe.

And chronologically in a second phase – not part of this report:

Task 5.2: New business models for nZEBs (Result 7)

- Development of innovative business models for nZEBs and new requirements translation for the new market segments (e.g. nZEB energy flat rates, flexible feed in tariffs, new nZEB contracting solutions, “all in” rent, Zero energy cost model, nZEB-public-private-partnership (PPP))
- Development of shared contract models between design/engineering and construction for integrated team processes, and development of collaboration models between private clients and developers or suppliers and use of public-private partnerships. Optimize use of partly outsourcing in design/engineering and construction.
- Business models for building up cooperatives to reduce investment costs due to collective purchasing. Coordination issues between several construction companies and/or consultants, especially in case different construction technologies are used within the same neighborhood
- Definition of the canvas structure for the nZEB construction business model
- Investigation of the fund services available for nZEB construction.

1.3. BUSINESS MODEL DEFINITION

Reviewing literature especially in the field of entrepreneurship and strategic management, in which the topic is regularly discussed, several different opinions and definitions for the term business model can be found. Magretta (2002, p. 4) for instance states that a business model describes how the different elements work together in order to give a value to customers. According to Magretta there are two areas that need to be described in a business model: all activities that are associated with making something like the design, the purchase of raw materials and the manufacturing and all activities that associated with selling something as for instance finding and reaching customers, transacting, distributing products or delivering services.

A business model is a simplified depiction of the way a complex and profit-oriented system generates, delivers and captures value. It illustrates the system's essential elements and their interactions and thereby enables the beholder to grasp and enhance it.

Being able to describe one's business model helps understanding the underlying logic, discussing and analysing the success potential and adjusting the relevant parameters in order to enhance the business model or create a new one.

The term 'business plan' is often confused with the term business model. While business models are simplified, descriptive ways of showing how a company plans to create, provide and levy value, the financial plan is only covered sketchily. A business plan, on the contrary, is a document that a company typically needs to convince banks and private investors as well as possible strategic part-

Furthermore, it must be clear how the company is going to generate money/ profit and how value can be provided for customers at appropriate costs (Magretta, 2002, p. 4). Casadesus-Masanella and Ricart (2007, pp. 2-3) define a business model as follows: "Business models refer to the logic of the firm, the way it operates and how it creates value for its stakeholders" and Osterwalder, whose theory has become very popular, defines a business model as something that "[...] describes the rationale of how an organization creates, delivers, and captures value" (Osterwalder & Pigneur, 2010). Based on the different opinions found, business models can be defined as follows:

ners in order to find financial aid. The information provided in a business plan therefore needs to be more precisely and reliable. For instance, analytical calculations of the financial bottom line need to be included. Moreover, the business strategy and the business model, by which the strategy is implemented, should be considered. According to that, the business model can be seen as the heart of the business plan. Within CRAVEzero the focus is on the evaluation and development of nZEB business models. Consequently, the data required and described is more qualitatively in nature.

2.METHODOLOGY

In order to evaluate nZEB business models the method is clustered into several steps:

- 1) CRAVEzero partners describe their business model
- 2) CRAVEzero partners find and describe business models of other stakeholders
- 3) CRAVEzero partners find and describe combined models; e.g. 2 or more partners
- 4) Evaluation at experts round table

- 5) Development of evaluation method
- 6) Application of developed method

An overview of the workflow to develop an nZEB related business model is given in Figure 5.

The relevant steps of the developed evaluation method are shown in Table 1 below. When a business model is developed, these steps can be considered to evaluate its success potential.

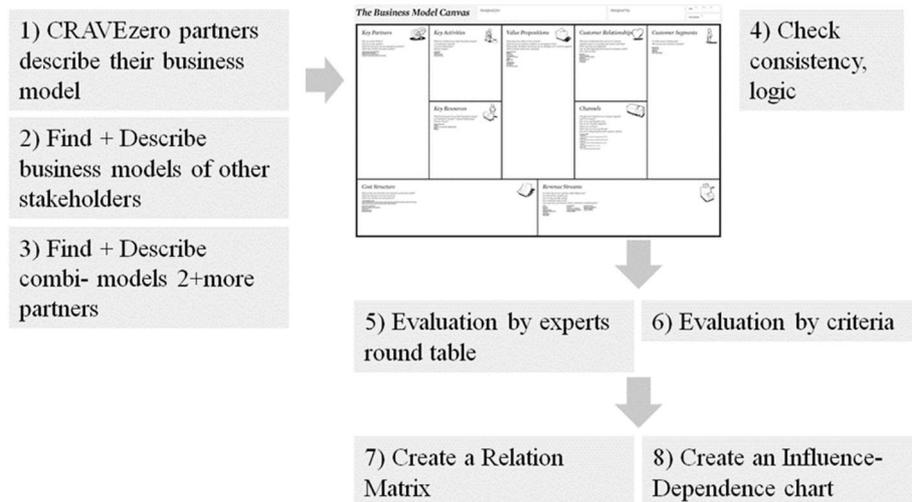


Figure 5: Business model canvas method (source: Fraunhofer ISE)

Table 1: Steps of the evaluation method (own depiction)

STEP	TOOL	ANTICIPATED RESULTS
Market view	PESTEL	Political, Economic, Socio-cultural, technical and environmental scope of the markets
	Porters' Five Forces	Identification of the industries attractiveness
Business View	Business Model Canvas	Which characteristics does a business model have? How is it structured? What are the essential factors of the Business Model?
	Consistency Check	Check for inner logic and consistency
	MICMAC (including influence-dependence-chart and causal loop diagrams)	Identification of critical success factors (CSF), interrelations and stability of the system Business Model
Customer View	Problem-solution-fit	Evaluation of the level of fit of customers' desires and solutions offered with the value proposition
Profitability View	Approximation due to insufficient data	Comparative analysis of the cost and revenue side of the business models from a project (case-study) perspective. How profitable is it for the company?
Decision making	Attractiveness Portfolio	Illustration of internal (Profitability view) and external (Customer view) attractiveness

These steps lead to a comprehensive and widespread view on nZEB business models and could be checked by the questions:

- Is the business model well thought-through?
- Is the business model profitable for the company?
- Is the customer's life enhanced by using the product/service and is he willing to pay the price?

- Are there enough reasons for the customer to choose the product/service over another?

In the following chapters the first steps of the evaluation method are shown. Here, a focus is on the description of provided business model canvases and the identification of common and differing aspects in regard to stakeholder perspectives and geographic regions. The entire developed evaluation method is described in more detail in a separate document.

2.1. BUSINESS VIEW

For the business model view at first the business models (BMs) of the project partners contributing to CRAVEzero are collected. For that, the Business

Model Canvas as proposed by Osterwalder and Pigneur (2010) is used.

2.1.1. BUSINESS MODEL CANVAS

Most business models (BMs) components that are regularly mentioned in literature are covered by the Business Model Canvas proposed by Osterwalder and Pigneur (2010) which is illustrated in Figure 6. It is an instrument to sketch ones business model and is used in order to collect information of the project partners BMs.

The Business Model Canvas consists of nine building blocks that depict which product/service is offered to which kinds of customers and how these

are reached in order to levy profit. Furthermore it is shown which kinds of activities and partnerships are required along with a company’s resources in order to provide the offer and which costs incur by that (Osterwalder and Pigneur, 2010).

The scholars propose to look at each building block separately and fill them with sticky notes including one element each. That way, the canvas can be discussed and enhanced easily.

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segment
	Key Resources		Distribution Channels	
Cost Structure			Revenue Streams	

Figure 6: The business Model Canvas as proposed by Osterwalder and Pigneur (Osterwalder and Pigneur, 2010)

2.2. FEEDBACK

All project partners have been asked to describe their nZEB-related business models using Osterwalder’s Business Model Canvas. 17 business models have been provided by the industry partners of the CRAVEzero project. During the feedback of the project partners, several questions have been discussed, especially in clarifying the definitions of

each canvas topic. A very special discussion has been hold in identifying revenue streams related to the described business model. It was stated for most described BMs from the partners, that it is not possible to excerpt detailed cost and revenues. Nearly all described BMs are embedded into the “business as usual” and therefor difficult to allocate

cost and revenues. To mitigate this lack of numbers the consortium discussed the possibility to cross-check the business models with the given numbers in WP2, the LCC analysis. But even in this WP it was difficult to allocate related costs. In elaborating additional options and during further discussions it was said in the scientific core group, that fixing cost and revenue streams makes only deeper sense if a

company wishes to develop a new and strictly bordered business model and deliver the related services separately to the client. This was not given for the described business models from the CRAVE zero partners.

For clarification a diagram was provided giving an overview about possible business model allocation and their combinations (see Figure 7).

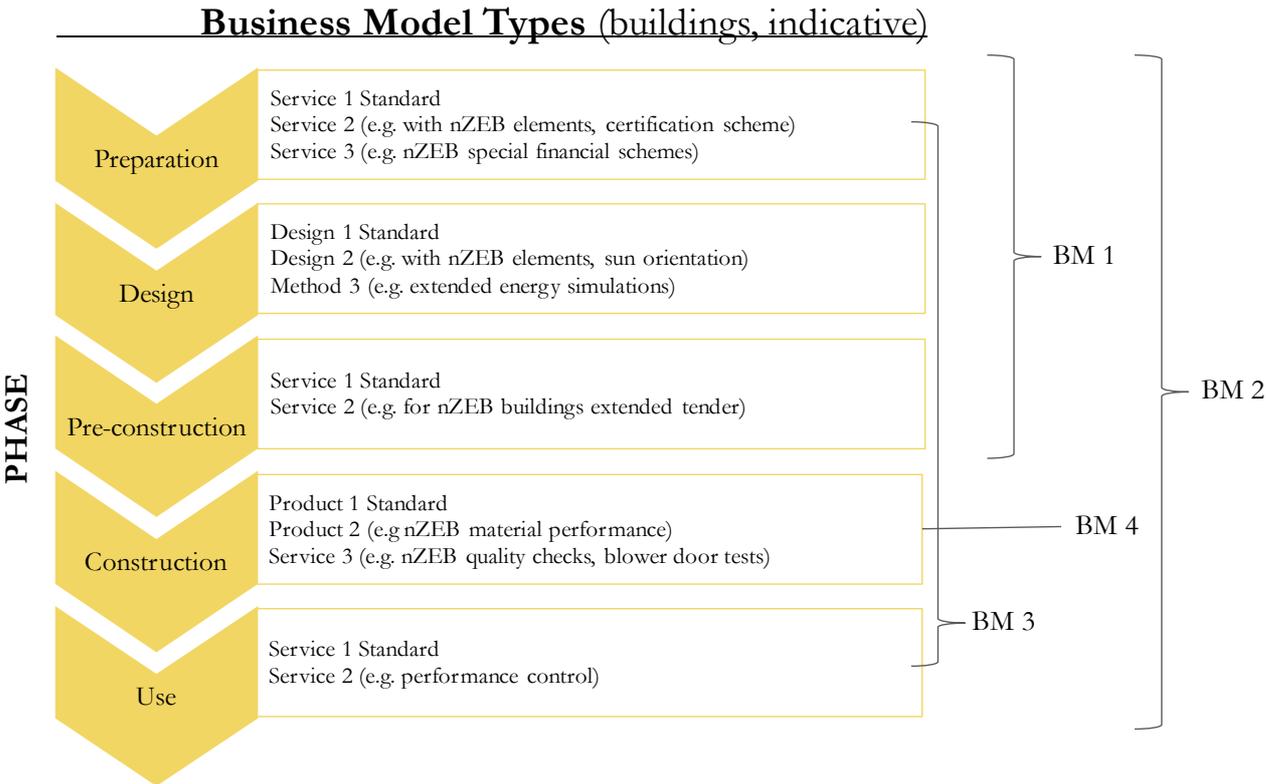


Figure 7: Business model allocation during building, planning and construction phase

3. BUSINESS MODEL REPOSITORY, OVERVIEW

For a more detailed impression, the provided business models are described in the following. In the depicted tables the factors and the keywords provided by the partners are indicated. The results are taken from the filled out Business Model Canvases, but are anonymized. In order to guarantee readability and keep the general structure of the BMC, the BMC is divided in 4 separated blocks:

1. **Value Proposition:** central building block of BMC,
2. **Customers:** right side of BMC describing all customer related issues,

3. **Company:** left side of BMC describing all company related issues, and
4. **Costs and Revenues:** bottom of BMC.

Furthermore, the respective characteristic strengths and key factors are described. The business models are addressing Real Estate Developers, Planners, General Contractors, Engineering and Construction, Facility Management and Operation as well as Urban Planning. They are summarized in Table 2

Table 2: Analyzed business models and their categorization

Category	Business Model	Country	Name	Stakeholder perspective
Real Estate Developer	BM 1	DE	General Contractor	Real Estate Developer and General Contractor
	BM 2	SE	Real Estate Developer	Developer (contractor)
	BM 3	SE	Net ZEB	Developer (contractor)
	BM 4	FR	Real Estate Development – Urban Planning	Real Estate Developer in Urban/ District Planning.
	BM 5	AT	Cooperative	Board of a Cooperative in Real Estate Development
Planner	BM 6	DE/AT	Participation in Competitions	Planner
	BM 7	DE/AT	LCC + CO ₂ optimization in early design stage	Planner
	BM 8	DE/AT	Passive House Certification / PHPP	Planner
	BM 9	DE/AT	Daylight Optimization	Planner
General Contractor	BM 10	FR	Design and Build Residential Sector	General Contractor
	BM 11	FR	Design and Build Tertiary Sector	General Contractor
	BM 12	IT	General Contract – Multiplan Houses	General Contractor
Engineering and Construction	BM 13	IT	Single Houses (b2C) E&C	Engineering and construction company
Facility Management & Building Operation	BM 14	FR	Facility Management	Facility Management (FM) company
	BM 15	AT/DE	Monitoring	User/ Owner
	BM 16	AT	PV-Contracting	Energy Service Company (ESCO)/ contractor
Urban Planning	BM 17	FR	Urban Planning	Real Estate Developer in the field of Urban Planning

3.1. BUSINESS MODELS OF PARTNERS

3.1.1. REAL ESTATE DEVELOPER

3.1.1.1. BM 1: REAL ESTATE DEVELOPER, GENERAL CONTRACTOR

General description:

The Business Model Canvas is filled out by the company's own perspective and describes the activities of the company as a Real Estate Developer and General Contractor. The company offers turnkey nZEBs including the intermediation service with possible investors, architect's services, building maintenance and administration. Since the offer includes the full range from start to finished building they approach various different customer segments from investors to owners, tenants, industries and municipalities. They accompany their customers from the beginning with a personal assistance making sure their purchasing process is care-free and they establish a long term customer relationship. Customers are reached by word-of-mouth advertisement built on a strong brand as well as via website and other communication channels. To provide the value proposition the company has

various partners for tasks as advertisement, engineering and construction, delivering resources and maintenance. Their main resources are their skilled employees and the value of the company's brand. The company captures value with brokerage fees, architectural and administrative services and asset sales. This compares to incurring costs for construction, post processing, salaries, maintenance and administration. According to the company this business model belongs to, they have a value-driven approach.

Strengths: Long term value proposition and long term customer relation (lock-in), value driven, brand

Key factors: skilled employees, widespread competences

VALUE PROPOSITION

- High quality (brand of company)
 - Turnkey, risk-reduced,
 - Convenient building (care-free)
 - Energy-efficient, ecological, individualized apartments/houses
 - Intermediation services for investors
 - Architect's services
 - Maintenance/administration
-

CUSTOMERS

Customer Relationship:

- Personal assistance
- Professional (care-free) relationship
- Attendance from the beginning

Distribution Channels:

- Long-term relationships
- Established brand
- Mouth-to mouth (public awareness)
- Website, telephone, personal, e-mail,

Customer Segment:

- Owners
 - Investor
 - Industry
 - Municipality
 - Seller of owned houses
 - Tenant
- ➔ Segmented
-

COMPANY

Key Partners:

Strategic alliances:

- Partners/clubs/associations -> advertising
- Buyer-Supplier-Relationship:
- Trades (wrought)

Construction work:

- Supplier, professional engineers (statics, energy...)

Delivering resources and services:

- Maintenance companies
- Maintenance work

Key Activities:

- Production:- design, supervising, administration, intermediation, maintenance (care-free-service)
- Regional market

Key Resources:

- Human
- Architects,
- Skilled workers
- Local partnership
- Intangible
- Company as brand

COSTS AND REVENUES

Cost Structure:

- Building costs, production costs, salaries, post processing, maintenance/administration expenses
 - Value chain by independent suppliers
- Value driven

Revenue Streams:

1. Asset sale
2. Architect services
3. Administration services
4. Brokerage fees

3.1.1.2. BM 2: REAL ESTATE DEVELOPER

General description:

The Business Model Canvas describes the perspective of a Developer (contractor). In this specific case, the nZEB was built for the company itself. Therefore, the business model consists of being a role model to future customers, unifying the locations of different company branches in one building (creating synergies), and saving costs for energy with the new office building compared to the previous one. As a consequence of being its own customer the relationship and distribution channels can be neglected. As partners only one subcontractor, belonging to the same company, was hired for geothermal heat pump systems. Other than that the

company's own workforce served to do extensive study about previous costs for the offices to ensure cost reductions as well as the iterative design process. The most important costs have been superstructure, heating and cooling system, ventilation and Photovoltaics (PVs). Revenues are created with the rents each company branch is paying for the new office.

Strengths: shows competences with own buildings, lighthouse building.

Key factors: All services in house

VALUE PROPOSITOIN

- Before the building was built, the company (which consists of many different braches) was situated at many different locations in the city of Helsingborg.
- By relocating everyone to the same office, it was possible to offer new/fresh office space with no increased costs. Furthermore synergies were expected when all branches got situated together.
- Important to “practice what you preach”. The company says that it is the number one green contractor. I.e. should have a “green office”

CUSTOMERS

Customer Relationship:

- Internal costumer

Distribution Channels:

- Internal

Customer Segment:

- Internal costumer
- Expected a high quality office which could show that our company “practice what we preach”
- (Niche market)

COMPANY

Key Partners:

- In this case, our company was developer, contractor and the costumer who would use the building.
- One subcontractor was hired for the geothermal heat pump system- also our own company

Key Activities:

- An extensive study was carried out to gather rental costs etc. for all branches before the new office and predicted costs for the new office in order to ensure that the new office would not increase costs
- Iterative design process with focus on dialog and cooperation

Key Resources:

- Energy engineer: Defining design principles
- HVAC engineer: Defining requirements, focusing on functions/performance instead of products
- Developer: Never deviating from the overall Net ZEB goal
- Contractor: Trying to do everything a little bit better

COSTS AND REVENUES

Cost Structure:

- Most important costs were superstructure, heating- and cooling system, ventilation and PVs

Revenue Streams:

- The costumers (different branches of our own company) were paying/renting for their own offices, coffee machines etc. They were willing to pay the same or less for a new office.

3.1.1.3. BM 3: NET ZEB

General description:

The Business Model Canvas describes the perspective of a Developer (contractor). The offer includes the entire building process to ensure customers get the Green and future proof building they expect. Therefore, several necessary measures are taken. The segment the business model aims to reach includes small/young families and couples willing to live in a Green Building. They are reached via internet where ongoing and previous projects are displayed and customers can sign up if interested. With additional sale meetings the company aims to strengthen the customer relationship by informing and dedicating time for interested customers before signing a contract. During the building process the personal contact is obtained.

In order to provide the offer various sub-contractors were involved to take care of the electricity, plumbing, ventilation and prefab of the buildings superstructure. The company's most important activities have been the definition of design principles, dialogue with municipalities, and the procurement of external funds for extra work/costs in design and user phase. The company relies on their different specialized employees for the offers provision as their key resource.

Strengths: Future proof: no financial and technical risks

Key factors: fixed price during lifetime

VALUE PROPOSITOIN

- Green building/future proof
 - Assuring the costumers that they will get what they expect
 - Several measures are implemented to create a green building
 - Free cooling (from ground)
-

CUSTOMERS

Customer Relationship:

- Ongoing projects are displayed on company website where people sign up to state their interest.
 - All interested people are invited to a "sale meeting" where they get more information and a personal contact is established and a contract is signed (if the costumer chooses)
 - After contract, personal contact is maintained. E.g. for choosing color in bed room etc.
-

Distribution Channels:

- Internet
-

Customer Segment:

- Mass market segment, small/young families and/or couples

COMPANY

Key Partners:

- In this case, the company was both developer and contractor. Four important sub-contractors were involved for:
 - Electricity
 - Plumbing
 - Ventilation
 - Prefab superstructure/walls

Key Activities:

- Design principles for Net ZEB were defined early in the process
- Dialogue with municipality to get “OK” to build Net ZEB instead of Passive House
- External funds were received for extra work/costs in design and user phase (energy measuring)

Key Resources:

- Energy engineer: Defining design principles
 - Architect: Striving for energy efficient design
 - Environmental specialist: Support throughout the process and securing external funds
-

COSTS AND REVENUES

Cost Structure:

- Most important costs were superstructure.

Revenue Streams:

- Prices are fixed. The customer pays a fixed price and pays a monthly fee after moving in into the dwelling
-

3.1.1.4. BM 4: REAL ESTATE DEVELOPMENT – URBAN PLANNING

General description:

The Business Model Canvas describes the perspective of a Real Estate Developer in Urban/ District Planning. The main attributes of the business model’s offer are the reduction of energy costs, the guaranteed neighborhood performance and the improvement of quality of living for inhabitants. The approached segments are private investors such as individuals or companies as well as public investors like social housing companies all of whom are reached by marketing measures like posters, flyers, or points of sale. A good relationship with the relevant community is aimed for in order to collect different opinions for possible improvements. Afterwards customer support is provided for the exploitation and maintenance of the relevant district.

Partners like urban planners and construction companies alongside with the marketing done by the company itself help provide the offer. Thereby, the company uses their good reputation and brand name, digital tools for sales and their experience in customization to grant the best outcomes.

The most relevant costs incurring are those for the purchase of the land, construction and payment of sub-contractors. In turn, the company captures value by selling buildings and apartments to their customers.

Strengths: Guarantee of neighborhood performance, upgrade quality of life

Key factors: Focus on value, urban planning knowledge

VALUE PROPOSITOIN

- Reduction of costs (thanks to energy savings + production / resale of renewable energy)
- Guarantee neighborhood performance by a third party (via obtaining environmental labels)
- Improve and maintain the quality of life of users
- Anticipation of future thermal regulations

CUSTOMERS

Customer Relationship:

- "Community" to be maintained in order to collect the opinions and improvements proposed by users
- Provide support (at least at the beginning) for the exploitation/maintenance of the district

Customer Segment:

- Private investors (individuals, companies, etc.)
- Public investors (social housing, etc.)

Distribution Channels:

- Marketing (ephemeral points of sale, posters, flyers, etc.)

COMPANY

Key Partners:

- Urban planner (who gives the specifications)
- Neighborhood life animator
- Construction companies

Key Activities:

- Marketing ++

Key Resources:

- Reputation of the company
- Digital sales tools (3D models, virtual tours)
- Customer customization

COSTS AND REVENUES

Cost Structure:

- Purchase of land
- Construction costs
- Sub-contractors (community life animator...)

Revenue Streams:

- Sale of lots (buildings, apartments)

3.1.1.5. BM 5: COOPERATIVE

General description:

The business model canvas describes the perspective of the Board of a Cooperative, which in this case is active on the market as Real Estate Developer. The Cooperative aims to provide affordable and sustainable community living to residents interested in a community living model as well as private and commercial customers in collaborative building projects. In the future, it might be possible to have communities and municipalities as customers interested in developing cross-generational living projects. Features of the Cooperatives are support in the participation process, know-how and experience from previous projects, creditworthiness for financing and mobility solutions. The customer relationship is strengthened with meetings consisting of working groups of the association and the cooperative (founded by the association). Besides this direct contact some projects are actively advertised by workshops and events.

The Cooperatives key resources are voluntary working hours and human knowledge and experi-

ence. They make workshops to establish core groups for the implementation of community living projects, conduct financial and legal negotiations and search for planning and construction teams. Thereby, landlords like regional governments or municipalities, banks, consulting companies, architects, general planner as well as construction companies are the most relevant partners.

The cost structure of this business model is value-driven. Major costs incur for bank loans, construction and planning phase and service charges for the operation of the community living. Revenues are made with members of the association /other customers paying rents/usage fees.

Strengths: Very low fixed costs, voluntary work, human expertise

Key factors: Close collaboration of Cooperative and association, creditworthiness.

VALUE PROPOSITOIN

- Implement the idea of community living by offering:
- Know how
- Support in participation processes
- Legal framework
- Experiences from other projects
- Creditworthiness for financing
- Affordable and sustainable living
- Mobility solutions

CUSTOMERS

Customer Relationship:

- Sociocratic organized gatherings
- Working groups of the association meet with representatives of the cooperative which was founded by the association

Distribution Channels:

- Mostly face-to-face and personal contacts
- Members of the association and representatives of the cooperative themselves live and network these projects and contacts
- Some community projects are actively advertised by workshops and events

Customer Segment:

- Residents who are interested in a community living model
- Private and commercial customers interested in collaborative building projects
- In future maybe communities/municipalities which are interested in developing cross-generational living projects

COMPANY

Key Partners:

Generally:

- Landlords like regional government, municipality or ÖBB, who cooperate in planning and building law negotiations
- Bank
- Consulting companies

Project-specific:

- Architect
 - General planner
 - Construction and HVAC companies
-

Key Activities:

- Workshops and gatherings to establish core-groups for the implementation
 - Financial and legal negotiations
 - Search for planning and construction team
-

Key Resources:

- Human knowledge and experience
 - Voluntary person hours
 - Office with low administrating tasks
-

COSTS AND REVENUES

Cost Structure:

Clearly value-driven and variable cost-structure with "economics of scope"-characteristics, depending on each single community building project:

- Bank loans
- Construction and planning costs
- Capital
- Service charges from the operation of the community living

The only exception are very basic fixed costs for the office administration - but are on a minimum level when no project is actually in development

Revenue Streams:

Residents / costumers are willing to pay for:

- Building project development
- Solvency
- Know-how for implementation
- Different usage and subscription fees / rent
- Basics to establish and run the cooperative

Both recurring and transaction revenues by dynamic pricing on negotiation basis

3.1.2.PLANNER

3.1.2.1. BM 6 PARTICIPATION IN COMPETITIONS

General description:

The Business Model Canvas describes the perspective of a Planner. In this case the company describes their business model of taking part in calls for tenders in order to get acceptance of a bid. Within their bid they propose innovative drafts/concepts that minimize the life cycle costs and CO₂ emissions of a building. Possible customer segments are building owners, operators and end users wishing to build nZEBs. Since the competition is anonymous there is no relation to the customers needed at this stage. Required documents are handed in and published if the competition was won. In order to create the bid the company cooperates with architects, planners of building services and municipalities to get all necessary information.

The company's own experts use their experience and conduct life cycle assessments based on benchmarks as well as energetic assessments. Cost incur for personal expenditures and general office requirements. Revenues, in the contrary only arise if the company receives acceptance for the bid (pre-defined prize money). In case of loaded competitions, where only a limited number of competitors are participating, a base budget is received additionally.

Strengths: Getting more experiences with every call for tenders

Key factors:

Experts' know-how; sufficient resources

VALUE PROPOSITOIN

- Innovative drafts which minimize the life cycle costs and the output of CO₂

CUSTOMERS

Customer Relationship:

- Anonymous competition: no relation with the customer
- Invited competition: Customer relation by positive experiences from former projects

Distribution Channels:

- Publication of the competitive documents of the prizewinners

Customer Segment:

- Building owner with the wish to build NZEB
- Building owner with roles:
 - Owner
 - Building operator
 - User

COMPANY

Key Partners:

- Architects
- Planners of building services
- Municipality for information about regulations for utilization of environmental energy

Key Activities:

Analysis from site-specific heat and cold sources

- Energy indicator estimation
- Concept design

Key Resources:

- Expert know-how
- LCC assessment on the basis of benchmarks
- Energy assessment (sefaira)

COSTS AND REVENUES

Cost Structure:

- Personnel expenditure of experts
- General office costs

Revenue Streams:

- Anonymous competition (prizewinners receive predefined prize money)
- Loaded competition (invited participants receive a base budget + prizewinner prize money)

3.1.2.2. BM 7: LCC + CO₂ OPTIMIZATION IN EARLY DESIGN STAGE

General description:

The Business Model Canvas describes the perspective of a Planner. The company offers energetic concepts for nZEBs that minimize the life cycle costs and reduce the CO₂ emissions by making use of passive systems and environmental energy. Possible customers are building owners, operators or end users. The relationship needed is not as intense and limited to a contract for the energetic consultation and evaluation resulting in a final report about the energetic quality of the building. The company makes use of their employees know-ho, different simulation software, Building information management (BIM) and a self-developed life cycle cost tool

for variant analysis. For information about the building partners like architects and planners of building services are consulted. Consequently, the biggest share of costs incurs for personnel expenditures of experts and salaries followed by general office costs. The reward for the energetic concept depends on the size of the project, number of variants etc. and is regulated in the contract signed.

Strengths: Focus on one phase during planning process

Key factors: Tool knowledge and efficient use

VALUE PROPOSITOIN

- Innovative and optimized energetic concepts which minimize the life cycle costs and the output of CO₂ - including passive systems and environmental energy

CUSTOMERS

Customer Relationship:

- Contract for energetic consultation and evaluation of a building project

Distribution Channels:

- Report about the energetic quality

Customer Segment:

- Building owner with the wish to build NZEB
- Building owner with rolls:
 - Owner
 - Building operator
 - User

COMPANY

Key Partners:

- Architects
- Planners of building services

Key Activities:

Simulation / evaluation of energy related performance indicators:

- Energetic evaluation
- Thermal simulation
- Daylight simulation

Key Resources:

- Expert know-how
- Simulation software (designbuilder, IDAice, SolarComputer)
- BIM (Revit)
- LCC Tool (own development) for variant analysis

COSTS AND REVENUES

Cost Structure:

- Personnel expenditure of experts
- General office costs

Revenue Streams:

- Reward according to contract with developer

3.1.2.3. BM 8: PASSIVE HOUSE CERTIFICATION / PHPP

General description:

The Business Model Canvas describes the perspective of a Planner. PHPP is a passive house planning tool that enables to increase a building's energy efficiency. Afterwards a certificate, proving the increased energy efficiency is awarded. The chosen customer segments are building owners, operators and end users that make an according contract with the company. Customers can become aware of the offer due to the company being officially listed as a PHPP planner, references and word-of-mouth advertisement.

The company's key activity to provide the offer is the optimization of the thermal envelope of buildings making use of the employees' know-how, the PHPP excel sheet and architectural design. Consequently the most important costs within this business model are personnel expenditures, general office costs and the PHPP certification while rewards are fixed in the regarding contract.

Strengths: expert knowhow, excellent references

Key factors: PHPP excel sheet, listed PHPP planner

VALUE PROPOSITOIN

- PHPP Certificate
 - Optimized building performance
-

CUSTOMERS

Customer Relationship:

- Contract with client

Distribution Channels:

- Publicity
- Excellent references
- Listed PHPP planner

Customer Segment:

- Building owner with the wish to build NZEB
 - Building owner with rolls:
 - Owner
 - Building operator
 - User
-

COMPANY

Key Partners:

- Architects
- Building physics
- Client / user

Key Activities:

- Optimization of the thermal envelope

Key Resources:

- Expert know-how
 - Architectural design
 - PHPP excel sheet
-

COSTS AND REVENUES

Cost Structure:

- Personnel expenditure of experts
- General office costs
- PHPP certification

Revenue Streams:

- Reward according to contract with developer
-

3.1.2.4. BM 9: DAYLIGHT OPTIMIZATION

General description:

The Business Model Canvas describes the perspective of a Planner. By making use of optimized daylight supply the company offers cost reductions for energy needed for artificial light as well as increased visual comfort. Again, typical customer segments are building owners, operators and end users that are attracted by public advertisement and excellent references. The company's task is the daylight simulation based on information given by partners such as architects, building physics and the clients them-

selves. The daylight simulation is done by the company's experts using various (simulation) soft wares. This results in big shares in costs for personnel expenditures and general office costs. Rewards are regulated in the signed contract with the developer.

Strengths: Valuable service of one special aspect

Key factors: Client must be aware of special aspect, tool knowledge and efficient use

VALUE PROPOSITOIN

- Optimized daylight supply → reduced costs for artificial light
- Optimized visual comfort

CUSTOMERS

Customer Relationship:

- Contract with client

Distribution Channels:

- Publicity
- Excellent references

Customer Segment:

- Building owner with the wish to build NZEB
- Building owner with rolls:
 - Owner
 - Building operator
 - User

COMPANY

Key Partners:

- Architects
- Building physics
- Client

Key Activities:

- Daylight simulation

Key Resources:

- Expert know-how
- Simulation software (IDAice)
- BIM (Revit)
- 3D model

COSTS AND REVENUES

Cost Structure:

- Personnel expenditure of experts
- General office costs

Revenue Streams:

- Reward according to contract with developer

3.1.3.GENERAL CONTRACTOR

3.1.3.1. BM 10: DESIGN AND BUILD RESIDENTIAL SECTOR

General description:

The Business Model Canvas describes the perspective of a General Contractor. The values offered for the customer segments social housing companies, private investors and private landlords are risk reduction (of fuel poverty and obsolescence), enhanced simplicity of maintenance and operation, quality and durability, easy usage, possible Energy Performance Guarantee (EPG), stable rents for final users, a strong company image and large workforce, possible environmental certifications.

Customers trust is gained with a simple but clear communication and references on past nZEB projects. Thereby the company tries to reach large investors in explaining them the benefits of nZEBs. For public investors the public market code needs to be followed which makes marketing less necessary and important. Here the company takes part in public calls for tender in order to get new projects.

The most important resources for the company are their technical expert workforce. Therefore, internal training for sales and technical staff is one of their

key activities. Moreover, the company emphasizes on communication with customers to spread knowledge and increase interest in nZEBs and capitalize return on experience of previous projects. Many tasks in the building process are outsourced to the various partners such as energy providers, building operators, industry suppliers, investment banks, certification entities and contractors.

The main costs for the provision of the offer are for raw materials in the construction process, manpower for the installation, studies and consultancy and certifications. Revenues are generated with the sale of buildings and apartments as well as energy savings within an EPG contract.

Strengths: Guarantee of building performance and operation cost, widespread competences

Key factors: learning and up/down-scaling from previous projects

VALUE PROPOSITION

For social housing and private landlords:

- Less risk of fuel poverty of the final users (→ less risk that they do not pay their rent)
- Easy maintenance and operation
- Quality / durability
- Comfort
- Easy usage
- The nZEB building has less risk of obsolescence (from a thermal regulation point of view)
- We can propose Energy Performance Guarantee → the energy charges of the building are guaranteed
- Stable rent charges for the final user of the building for 20-30 years (because the investor bears the over costs, and then pass on these costs on the lend of the user)

Private investors:

- Strong image / attractiveness of nZEB (→ possibility for the investor to sell the building at a higher price)
 - Company is known for the quality of its works and the size of its engineer workforce
 - We can propose Energy Performance Guarantee → the performance of the building is guaranteed
 - We can propose environmental certifications or label → more trust, since the quality of the building is certified by an independent third party
-

CUSTOMERS

Customer Relationship:

For private investors:

- Simple and clear communication
- Build client's trust in our company (showing them our past nZEB references for example)
- Target the largest investors (those at the top of the pyramid) to explain them the benefits of nZEB

For public investors:

- They have to comply with the Public Market Code, so the marketing is less necessary as they have to launch calls for tenders and to compare at least 3 offers

Distribution Channels:

- For social housing companies: we answer to public calls for tenders
 - Private investors/ landlords: classical distribution channels (Bid solicitation, direct contact with the client)
-

Customer Segment:

- Social housing companies (semipublic)
 - Private investors (invest and sell immediately after the construction)
 - Private landlords (invest and then rent the building)
-

COMPANY

Key Partners:

- Energy provider (who sometimes pays for the HVAC systems of the building)
- Building operator (especially if there is an Energy Performance Guarantee)
- Industries/suppliers (for standardization) → supply chain optimization
- Investment banks (for Public Private Partnership contracts, as the bank bears the investment instead of the client)
- Certification entities
- Contractors
- Fatal energy producers (data centers, industries etc.) → can be used to supply the nZEB

Key Activities:

- Internal training of the sales staff and the technical staff)
 - Communication to the clients about our know-how and the benefits of nZEB
 - Capitalize return of experience on our previous nZEB references
-

Key Resources:

- nZEB technical experts
-

COSTS AND REVENUES

Cost Structure:

- Raw material for construction
- Manpower for installation
- Studies/consultancy
- Certification costs

Revenue Streams:

- Selling of the building (for design&build contracts); Energy savings (for EPG contracts)
-

3.1.3.2. BM 11: DESIGN AND BUILD TERTIARY SECTOR

General description:

The Business Model Canvas describes the perspective of a General Contractor. It is similar to BM 10. The difference lies in the chosen customer segment. In this case the company approaches private investors that either sell or rent the building after the construction or occupy it (as companies headquarter for example). For these projects, the company takes part in public calls for tenders and after get-

ting acceptance communicates directly with the customer. Thus, marketing plays a minor role. Compared to BM 10, here another type of revenue stream is possible: a leasing contract of the nZEB for public-private partnership (PPP) contracts.

Strengths: Guarantee of cost and performance

Key factors: Knowledge of process and detailed cost data

VALUE PROPOSITION

- The company is known for the quality of its works and the size of its engineer workforce
- The nZEB building has less risk of obsolescence (from a thermal regulation point of view)
- We can propose environmental certifications or label → more trust, since the quality of the building is certified by an independent third party
- Strong image / attractiveness of nZEB in the private sector (→ possibility for the investor to rent/sell the building at a higher price)
- More comfort
- Stable rent charges for the final user of the building for 20-30 years (because the investor bears the over costs, and then pass on these costs on the lend of the user)
- No real over costs for the investor (same reason as above)
- We can propose Energy Performance Guarantee → the performance of the building is guaranteed

CUSTOMERS

Customer Relationship:

- Simple and clear communication
- Build client's trust in our company (showing them our past nZEB references for example)
- Target the largest investors (those at the top of the pyramid) to explain them the benefits of nZEB

Customer Segment:

- Private investors that sell the building to their client (immediately after the construction, or < 5 years after)
- Private investors that rent the building to their clients
- Private investors that occupy the building (companies headquarters for example)

Distribution Channels:

- Bid solicitation
- Direct contact with the client

COMPANY

Key Partners:

- Energy provider (who sometimes pays for the HVAC systems of the building)
- Building operator (especially if there is an Energy Performance Guarantee)
- Industries/suppliers (for standardization) → supply chain optimization
- Investment banks (for Public Private Partnership contracts, as the bank bears the investment instead of the client)

Key Activities:

- Internal training of the sales staff and the technical staff
- Communication to the clients about our know-how and the benefits of nZEB
- Capitalize return of experience on our previous nZEB references

Key Resources:

- nZEB technical experts
- Financial engineering team (to build funding)

- Certification entities
- Contractors
- Fatal energy producers (data centers, industries etc.) → can be used to supply the nZEB

plans)

COSTS AND REVENUES

Cost Structure:

- Raw material for construction
- Manpower for installation
- Studies/consultancy
- Certification costs

Revenue Streams:

- Selling of the building (for design&build contracts),
 - Leasing of the building (for PPP contracts)
 - Energy savings (for EPG contracts)
-

3.1.3.3. BM 12: GENERAL CONTRACT – MULTIPLAN HOUSES

General description:

The Business Model Canvas describes the perspective of a General Contractor. The offer includes customized and prefabricated solutions and covers architecture and engineering, the purchasing contract as well as on-site building operation management. Due to the focus of all phases in one business model time and costs for the provision of the offer can be controlled more easily. The company offers these services to Real Estate companies/developers and private companies of different sizes. The company emphasizes personal customer relations and has a strong reputation. Customers reach the company directly or via architectural and engineering firms or investment funds all of which

can be seen as partners. Additionally companies for finishing works, technical equipment and windows are partners needed to provide the offer. The company itself takes care of the cost estimation and engineering solutions, sales contracts, project management and business relationships all of which requires skilled employees as a main resource. Costs and revenues strongly depend on the regarding project.

Strengths: Control of design and build process

Key factors: Transfer to special prefab process, full control of cost and quality

VALUE PROPOSITOIN

- Integrated competencies: architectural & engineering, prefabricated solutions, purchasing contract, on site operation management
- Cost & time control
- Flexibility for custom solutions / variances
- Long track of experiences in high quality prefabricated solutions

CUSTOMERS

Customer Relationship:

- Personal relation based on technical design and cost competencies and good family owner reputation

Customer Segment:

- Real Estate companies/developer
- Private companies (small/medium/big)

Distribution Channels:

- Architectural & engineering firms
 - Direct relationship with final customer companies
 - Investment fund
-

COMPANY

Key Partners:

- Architectural & engineering firms
- Main suppliers for:
 - Finishing works
 - Technical equipment
 - Windows
- They are very important not only for work quality and to respect cost planned but also during the commercial activities for work acquisition.

Key Activities:

- Cost estimate and engineering solution
- Purchasing contract
- Project management
- Business relationship

Key Resources:

- Project manager
- Cost estimator
- Buyer & contract manager

COSTS AND REVENUES

Cost Structure:

- Main costs are referred to direct cost for the work; we used to externalize most of the work so the most of them are variable costs.
- Fixed costs are related to indirect structure for commercial activities, project management & control, purchasing process.

Revenue Streams:

- Only 1 stream: engineering & construction even if each single big work is like a single stream!
- Price derives from detailed cost "plus" a markup for the contracting and works management

3.1.4. ENGINEERING AND CONSTRUCTION

3.1.4.1. BM 13: SINGLE HOUSES (B2C) E&C

General description:

The Business Model Canvas describes the perspective of an engineering and construction company. The main attributes of the business model are the delivery of high quality, customized buildings to a fixed price in a fixed time. The BM covers all stages from design to delivery/ commissioning. The approached segments are private customers/ families with a willingness to invest more than average also in a modern design and architecture, who want to build a new single-family house. Personal contact and a close relationship with the customer are essential for the delivery of the high quality buildings and the former customers are the most important "promoters" (word of mouth).

Partners like brand ambassadors and energy designers as well as suppliers for windows and technical equipment help to deliver the product. Thereby, the company uses their good reputation and brand name and good contacts to the client, internal experience

and new own developments (e.g. two own patents) to grant the best outcomes.

The main cost drivers are the activities directly related to the delivery of the product (personnel costs in project management and design, materials/ production, construction). Additionally, several fixed costs like e.g. marketing channels and product development in the company have to be covered. All in all, costs are minimized by a high share of standardization of the model-house. The company's revenue derives from the design/ architectural activities as well as a markup on the detailed price for each building.

Strengths: High customization, all services along the process, cost and schedule guarantee

Key factors: flexible handling of internal processes, communication with customer

VALUE PROPOSITOIN

- Architectural design of our houses model and high quality in any details
 - High customization with the qualified support of an architect
 - Total contract service managing the whole process from design to delivery
 - Fixed and guaranteed time and cost
 - Innovative technology (2 patents) and integration of concrete and wood
 - Experience and solidity, Company has been building for 50 years
-

CUSTOMERS

Customer Relationship:

- Deep direct relationship with our expert based on service and competencies
- Last customers will became the main promoter

Distribution Channels:

- Direct channel for the final customer using market and communication channels
- External architects & other professionals

Customer Segment:

- Final customer/family who wants a new single house.

Target Group:

- High spending, 40-65 years old, professional, an entrepreneur or a corporate executive:
 - Likes architectural quality and modern design
 - Wants total contract service because it does not have time and / or does not want to deal with the numerous suppliers
 - Appreciate the role of the architect to support the custom design and his/her own decision-making process
-

COMPANY

Key Partners:

- Brand ambassador (External architects) & other professionals
- Main supplier for:
 - Finishing works
 - Technical equipment
 - Windows
- Energy Designer (analysis and solution)
- Customer as influencer

Key Activities:

- Sales process and customized process
- Product delivery
- Product development

Key Resources:

- Market & sales manager
 - Customizer owner
 - Project / client manager
 - Product developer
 - 2 Patents
-

COSTS AND REVENUES

Cost Structure:

- Main costs are referred to direct cost for the work and production operation
- Fixed costs are related to indirect structure for marketing & sales, project management, product development and improving collection.
- Design, operation, purchasing process cost should be compressed by standardization of model houses

Revenue Streams:

- Only 1 stream: architectural design & engineering & construction for "customized the product" (home model)
 - Price derives from detailed cost "plus" a mark-up for the designing, contracting and works management and in the future for the brand quality.
-

3.1.5. FACILITY MANAGEMENT AND BUILDING OPERATION

3.1.5.1. BM 14: FACILITY MANAGEMENT

General description:

The Business Model Canvas describes the perspective of a Facility Management (FM) company. The main attributes of the business model are a guaranteed energy and comfort performance of a building. Furthermore, it helps the client to lower operating and energy costs as well as accessing e.g. additional governmental funds. The BM also assures the use of the latest technology and integration in BIM. The approached segments are mainly private customers in the tertiary sector, but also other operators of large facilities/ administration buildings. The BM includes a close everyday relationship with the customer. Existing showcases are of major importance for convincing new customers.

In the delivery of the product/ service, several partners from the fields of energy monitoring and management, IoT and probably others, which are addressing the customer specific needs, are involved.

The main cost drivers are personnel costs and sub-contracts. The company's revenue derives mainly from the maintenance contract and probably from needed replacements of defective equipment.

Strengths: Guarantee of comfort and performance

Key factors: knowledge and automated controls, maintenance organization

VALUE PROPOSITION

- Strong know-how in energy performance and energy management
 - Energy & comfort performances can be guaranteed to the client (thanks to an EPG for example). Same for the energy production from RES
 - Help the client with the administrative steps to benefit from government financial incentives, when they have to renew their equipment
 - Regular audits of the state and the performances of the building equipment
 - Renegotiation of the client's energy supply contract (chase of the best value of money)
 - Monitoring of all interventions/changes and of the performance of the building thanks to BIM
 - Innovation ++
-

CUSTOMERS

Customer Relationship:

- Everyday relationship
- The facility manager from company becomes part of the client's team

Distribution Channels:

- References, past successful contracts with clients, word of mouth (reputation), clubs
 - Bring potential clients to past clients with successful relationships and results (=showcase of company's know-how)
-

Customer Segment:

- Mainly private tertiary (banks, offices) and industries.
- Owners of the building, and sometimes managers
- Less frequent: public tertiary (hospitals, prisons, schools), within Public-Private Partnership (PPP) contracts only

COMPANY

Key Partners:

- Companies/ Start-ups specialized in energy consumption measure
- IoT (people counting, comfort parameters measure, etc)
- Companies specialized in specific services/ maintenance (e.g.: companies operating/ maintaining the office restaurant, cleaning companies, companies specialized in maintaining lifts, etc.)
- For nZEB districts: companies specialized in operating smart-grids

Key Activities:

- Energy audits
- Communication ++ with the client (build strong relationships)

Key Resources:

- Energy monitoring tools (e.g.: Hyper vision from own company)
- BIM
- Data management platform
- Energy managers

COSTS AND REVENUES

Cost Structure:

- Subcontracting;
- Spare parts + new equipment;
- Manpower (energy managers etc.)

Revenue Streams:

- Maintenance contract (subscription to a maintenance service over a certain period of time);
 - Replacement of defective equipment (only if the related costs are higher than the maximum amount included in the maintenance contract)
-

3.1.5.2. BM 15: MONITORING

General description:

The Business Model Canvas describes the perspective of a service provider for the building operation. The main attributes of the business model are an automated user-feedback about mal-functions of installed (HVAC) technologies and an associated constant adjustment of the respective technology. Concerning the customer segment, relation and distribution channels no information was provided.

In the delivery of the service facility managers and maintenance companies are essential partners.

The main cost drivers are personnel expenditures. The company's revenue derives mainly from reduced operating costs.

Strengths: detailed knowledge of energy-flows in property, automated user-feedback

Key factors: Comprehensive monitoring concept as well as adequate equipment and software

VALUE PROPOSITION

- Automatic feedback if some building service did not work correctly
 - Constant readjustment of the building technology
-

CUSTOMERS

Customer Relationship:

- Not specified

Customer Segment:

- Not specified
-

Distribution Channels:

- Not specified
-

COMPANY

Key Partners:

- User
- Facility manager
- Maintenance company for building services

Key Activities:

- Documentation and evaluation of the energy flow and media streams in the building

Key Resources:

- Software for the documentation and evaluation of the measured values
-

COSTS AND REVENUES

Cost Structure:

- Personnel expenditure of experts
- Electricity for sensors

Revenue Streams:

- Reduced operating costs
-

3.1.5.3. BM 16: PV CONTRACTING

General description:

The Business Model Canvas describes the perspective of an Energy Service Company (ESCO)/contractor. The main attributes of the business model are the local and secure energy supply and the reduced risks of construction and maintenance for the building owner/ user. Furthermore, it creates additional revenues during the operation of the building. The approached segments are mainly building owners, but also utilities. The BM includes a contractual relationship between stakeholders, but not necessarily a close personal one and customers are mainly reached by different marketing channels and word of mouth. In the delivery of the service, several partners are involved. The main ones are PV-producers and

installers, the utility, insurance company and the building owner. The goal is to design, build and operate building integrated and roof-top PV systems. Therefore, salesmen/ women and technical as well as legal staff is essential.

The main cost drivers are fixed costs (office and staff) and flexible costs depending on the number of installed systems. The company's revenue derives from the sale of electricity.

Strengths: economies of scale, focus one specific topic and technology

Key factors: acquisition of roofs, communication with different stakeholders, design win-win contracts for stakeholders involved

VALUE PROPOSITOIN

- Good design
- Green image, better energy balance
- Maintenance roof area
- Future ownership
- Affordable energy supply
- Revenues by (a) reduced power price, (b) interest on invested capital (nominal ~2.5%),(c) fixed rental revenues
- Partly financed roof construction
- Local and secure energy supply
- Reduced risks of construction and maintenance

CUSTOMERS

Customer Relationship:

- Effort for the relationship is low, only at the beginning one needs more personal contact
- Contract with the building owner (remuneration for owner, power business, maintenance, marketing)
- Contract with the utility (power business)
- Subsidies from society/ public

Distribution Channels:

- Marketing by ESCOs
- PR by municipalities
- Word of mouth
- On site visibility of installations
- Personal contract- establishment, communication and support

Customer Segment:

- Energy utilities and their customers who pay for the power
- Society - production of renewable energy
- Building owners and users like:
 - Industry
 - Residential
 - Commercial
- Offering roof area, consume power, etc.

Kind of segment: Mass market

COMPANY

Key Partners:

- PV-module producers
- PV-installer
- Financial institutes
- Technical Planners/ architects
- Research and testing institutes
- Grid operators and ESCOs
- Building owners who offer areas for installation
- Assurance institutions

Key Activities:

- Update technical Know-how
- Sale and marketing
- Planning
- Contracts
- Maintenance
- Accounting/controlling

Key Resources:

- Salesmen/women and technical support
- Legal adviser for the contracts
- Financial resources for investments

COSTS AND REVENUES

Cost Structure:

- Mixture of cost and value driven (e.g. service=value, investment = costs)
- Fixed costs: for sales/support/ business contacts/negotiations
- Variable costs: legal advice (if outsourced), maintenance (if outsourced), installation + purchase of PV modules
- Economies of scale: yes. Purchase, maintenance, accounting, all services
- Economies of scope: could be combined with DH, CHP, wind energy

Revenue Streams:

- Revenues: sold power (usually by contract with energy supplier/ Austrian Eco power funding coordination), incentives (on investment or on sold power - fixed price)
- Costs: pay-back of investment to share-holders (recurring), maintenance, establishment of contracts (transaction), insurance ...
- Additional benefit: establishes strong relationships with customers

3.1.6.URBAN PLANNING

3.1.6.1. BM 17: URBAN PLANNING

General description:

The Business Model Canvas describes the perspective of a Real Estate Developer in the field of Urban Planning. The main attributes of the business model are guaranteed balanced district ecosystems and district performances. Furthermore, it helps to restore districts attractiveness. The approached segments are property developers and investors as well as public institutions. The BM includes a close involvement of users and authorities if possible. If it is about the participation in calls for tenders, this involvement cannot take place in the first step (only if tender is won in the further planning process).

In the delivery of the service, several partners from the community and land owners, designers/ architects to energy grid managers are involved. The goal

is to design an optimized district addressing the customers and user's needs as good and cost-optimal as possible achieving a high energy standard in the overall district (nZEB district). Therefore, know-how of employees as well as different planning/ software tools are used in the process.

The main cost drivers are costs for land and technologies/ infrastructure. The company's revenue derives from the sale of the district/ area.

Strengths: Influence on decision level, touching all building relevant sectors

Key factors: communication and organization of many stakeholders

VALUE PROPOSITOIN

- Guarantee a balanced district ecosystem (social / economic / environmental) + functional mix
- Guarantee district performance by a third party (via obtaining environmental labels)
- Restores the attractiveness of the areas on which the eco-district is located

CUSTOMERS

Customer Relationship:

- Calls for tenders
- Users involvement in decision-making processes (co-creation, co-development)

Customer Segment:

- Property developer
- Public institutions (schools, hospitals)
- Investors

Distribution Channels:

- Calls for tenders
- "Appels à manifestation d'intérêt" or calls for interest
- Direct negotiations (no tender)

COMPANY

Key Partners:

- Town Hall / Community
- Owner of the land (public or private)
- Energy operator (if we develop a district with energy production common to several buildings)
- Urban planner, sociologist, ecologist
- Water, waste and energy networks operators
- Smart grid manager

Key Activities:

- Optimize the costs of nZEB districts
- Promote the benefits of the future district
- Anticipate future district uses and user needs, involving all stakeholders from the early stages of the project
- Synthetize the different aspects of that kind of project: construction, energy, real estate development, operating phase...

Key Resources:

- Energy Planning Tools (ex: District ECA)
- Urban planning tools
- Collect data related to the area of the future district (Open data)

COSTS AND REVENUES

Cost Structure:

- Purchase of the land; Shared energy production systems

Revenue Streams:

- Sale of the area + the district project

The presented business models of the partners are shown in the tables below. Business model BM 1 to BM 4 are addressing Real Estate Developers; BM 5 to BM 7 Planners; BM 8 to BM 10 General Con-

tractors; BM 11 Engineering and Construction, BM 12 Facility Management and BM 13 Urban Planning.

3.2. COMPARATIVE ANALYSIS OF BUSINESS MODELS

Having collected the different business models of the CRAVEzero industry partners, a comparative analysis is done in order to point out similarities and differences of the business models. Thereby possible geographical clusters, potential success

factors and repetitive patterns of specific stakeholders can be identified. The most relevant results are shown in this chapter starting with the comparative analysis of the business models' value propositions (see Figure 8).

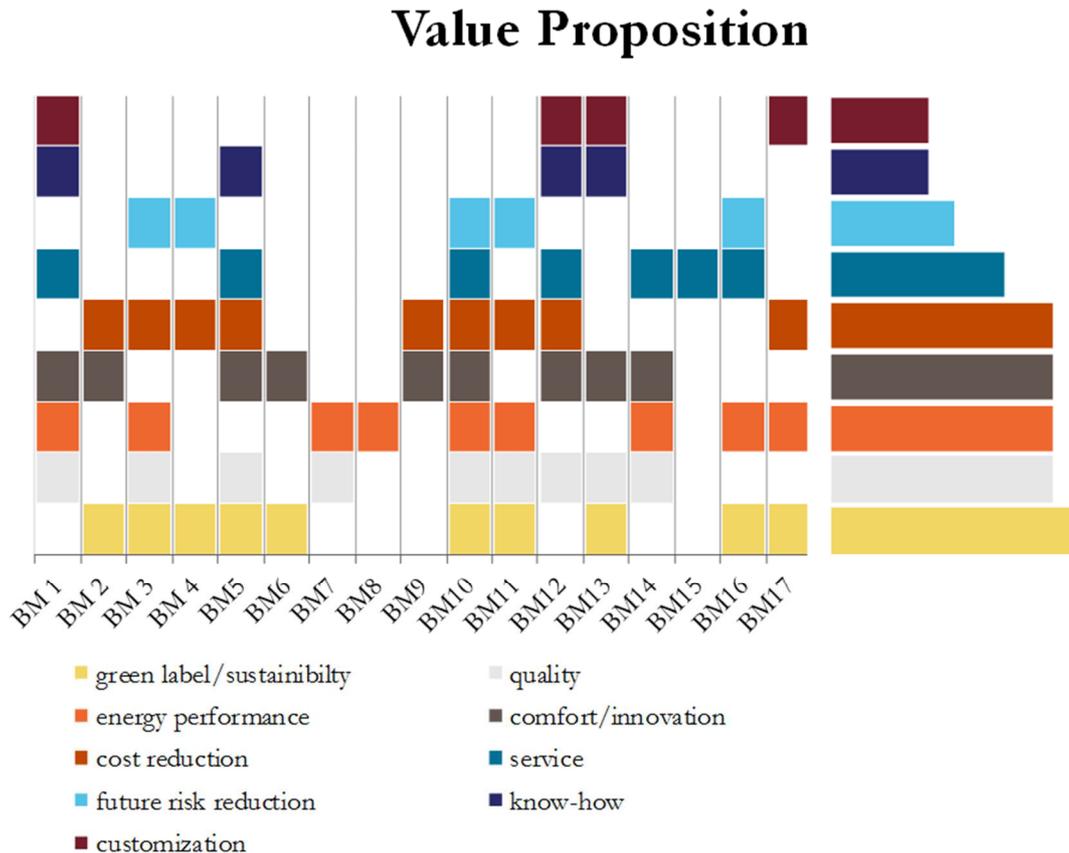


Figure 8: Comparative analysis of different Value Propositions

The most common features of the value propositions are Green labels, quality and improvements of the energy performance of buildings, and cost reductions. These features can be found in business models of all different stakeholder perspectives. Features like customization, future risk reduction and customization are less common and mainly found in the construction phase. Facility management has an additional focus on service and comfort for customers.

The differences in customer segments can be allocated to the different stakeholder types. Building owners are the most frequently mentioned segment followed by investors and companies (B2B - business to business) and final customers (renters).

When it comes to customer relationships it became apparent that almost every business model builds on personal relationships with their customers. This can be explained with the high degree of personal consultancy necessary and trust needed for customers to invest large amounts of money. Especially in the planning phase relationships are often limited to contractual obligations. Additionally real estate developers tend to hold informative events or use online channels for their customers to get informed. Another approach, here chosen by a general contractor, is information material (compare Figure 9).

Customer Relationship

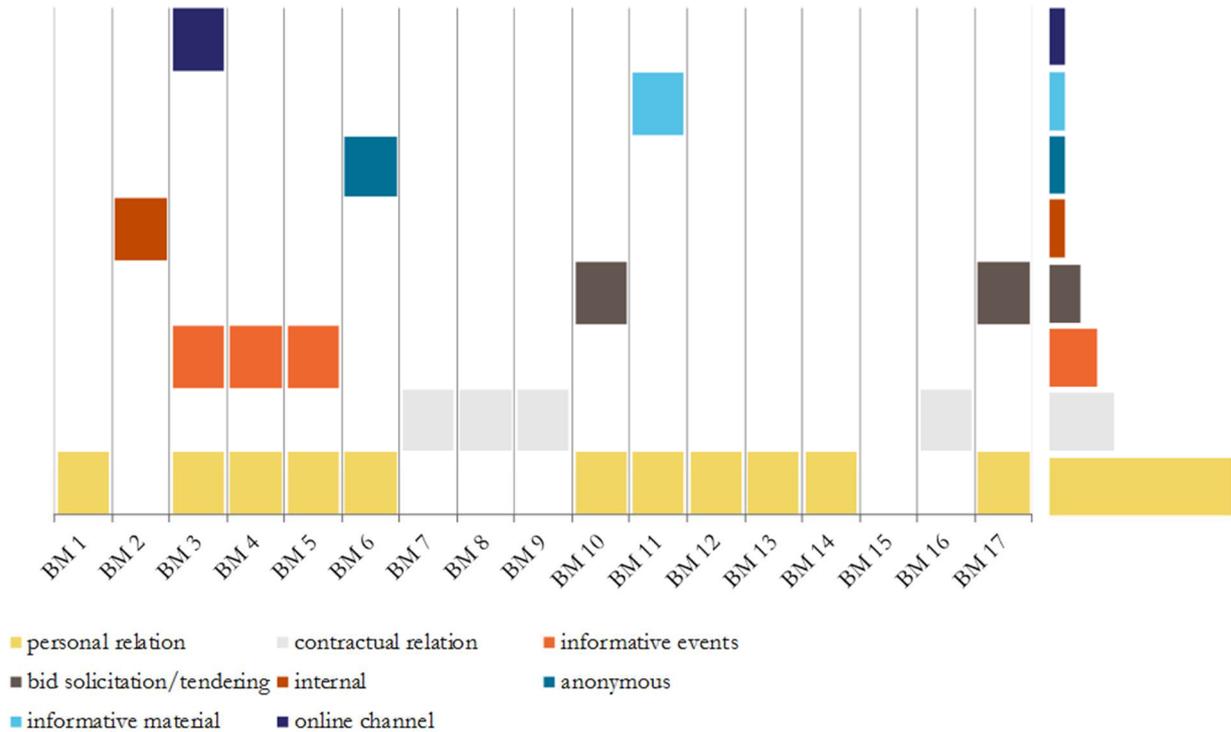


Figure 9: Comparative analysis of Customer Relationships

Strong customer relationships and trust are built and obtained making use of different distribution channels (see Figure 10). Many business models make use of references (e.g. on the companies' websites) or/and marketing and other communication channels. Especially General contractors stated to approach their clients directly. For (semi-) public contracts the contact is made by bid solicitation according to European regulations. Furthermore, some business models rely on their established brand for advertisement (word-of-mouth) while informative meetings for possible customers are less common.

The building block 'revenue streams' describes how a company aims to capture value with their offer. There are different options (as shown in Figure 11) like asset sales, leasing, brokerage fees or transaction revenues based on architect/ engineering/ construction services. Asset sales have been mentioned most, followed by additional services for administration, management and maintenance. Another commonly used stream is the EPG contract (mostly from General contractors and building operators).

Distribution Channels

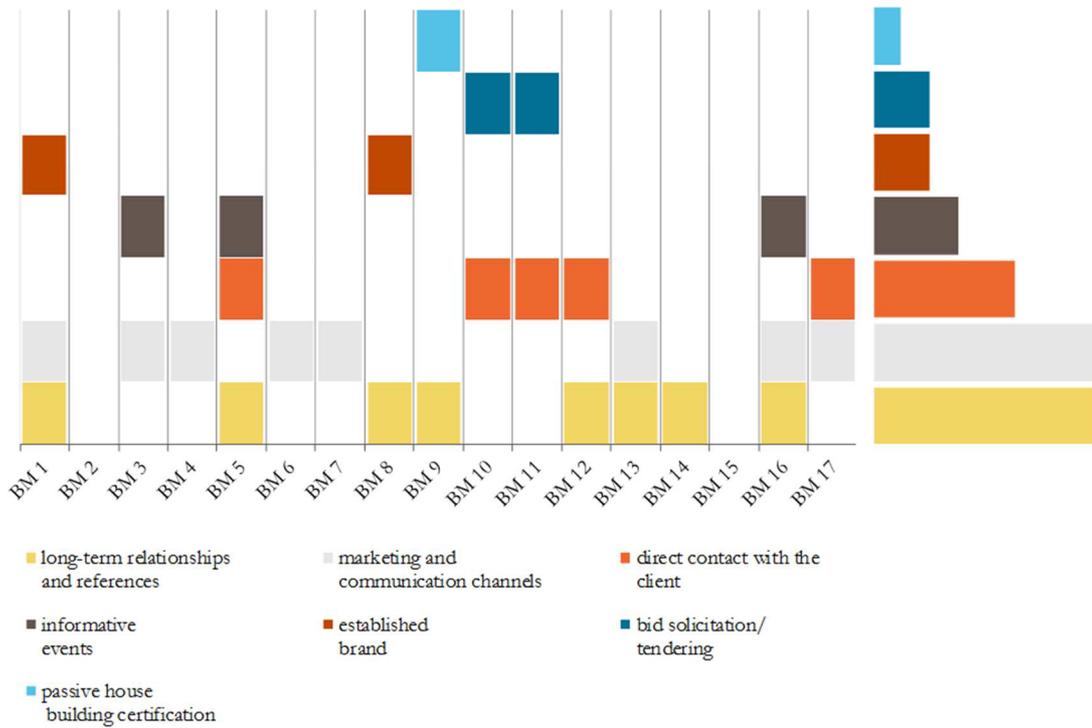


Figure 10: Comparative analysis of Distribution Channels

Revenue Streams

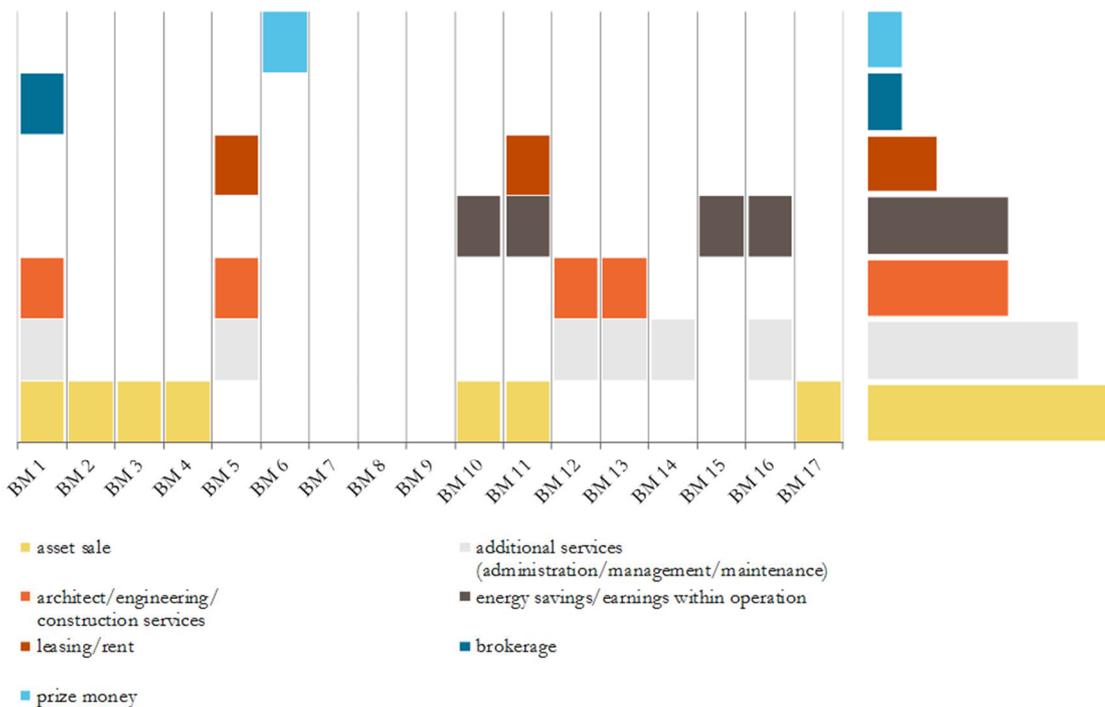


Figure 11: Comparative Analysis of Revenue Streams

Key Activities

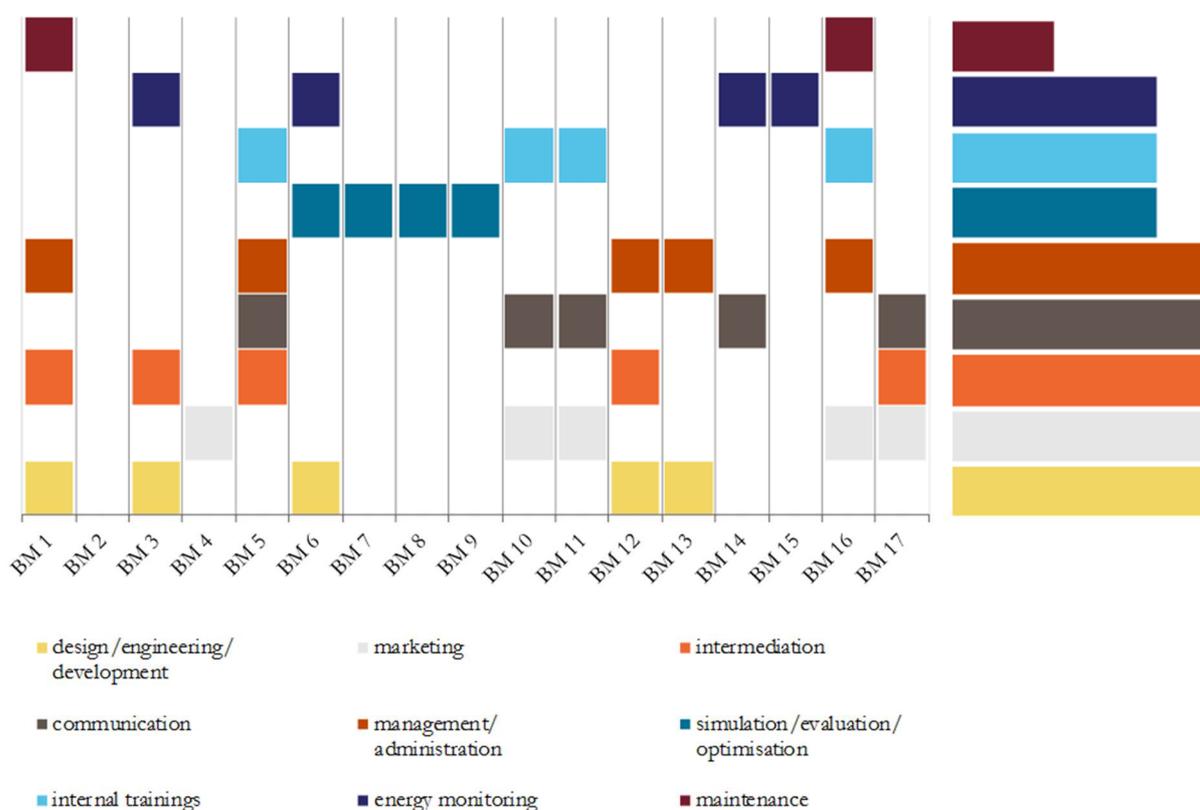


Figure 12: Comparative Analysis of Key Activities

The most common activities in the provision of nZEB related value propositions are the design/engineering and development, marketing, intermediation and communication with relevant stakeholders. Maintenance, internal trainings and energy monitoring are less common (compare Figure 12). When it comes to the cost structure the personnel expenditures play the major role followed by costs for the building and production process and administration/office costs. All other costs are strongly dependent on the regarding value proposition and required activities.

The Key resources can be distinguished by IT and human resources (see Figure 13). For the human resources the most important ones are the technical

experts as well as architects, project and client and sales managers.

The IT resources are mainly simulation and planning tools as well as monitoring and data management tools.

For those companies that outsource many of their tasks construction and energy companies are the most important partners followed by architects, engineers and technicians. Other mentioned partners were planners, building operators, maintenance companies, contractors, investment banks and certification entities. Less frequently mentioned were landlords, strategic partners, sociologists and town operators.

Key Resources

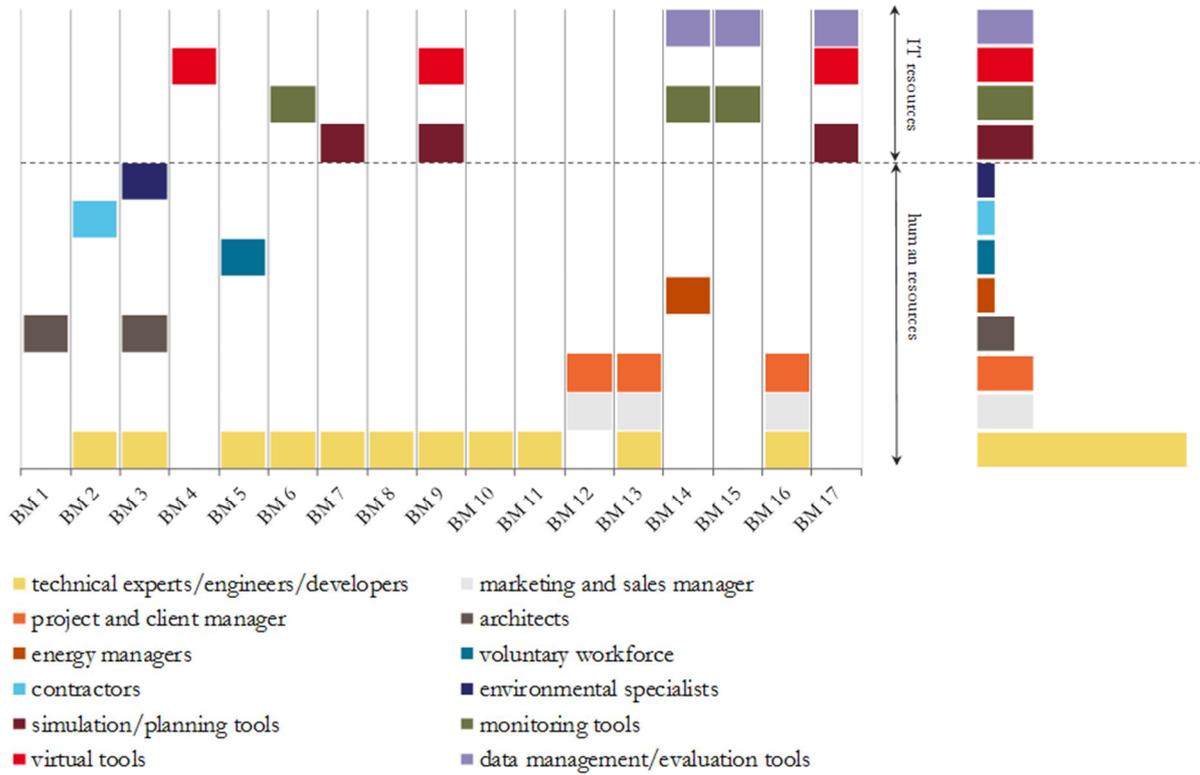


Figure 13: Comparative Analysis of Key Resources

3.3. CLUSTER OF BUSINESS MODELS

One of the aims of this deliverable was to sort different European nZEB business models by geographic clusters. Having collected the CRAVEzero partners’ business models, however, it became apparent that the parameters don’t tend to vary depending on the region where the companies are

situated. All of the given business models seem to be applicable in each of the biggest markets considering slight adjustments depending on legal frameworks. However, there might be more apparent differences for other stakeholders that have not been provided so far.

3.4. MATURITY OF MODELS

Even though the term business model has gained increasing attention in the past years, not every company is yet familiar with it and its concept.

Figure 14 shows the different maturity stages of business model innovation.



Figure 14: Maturity stages of the implementation of the business model concept in companies (following PROMETA Unternehmensberatung GmbH, n.d.)

The maturity of the implementation of business models in companies varies from *unknown* to *established*. The *Unknown* stage describes a company that has no business models for their daily business described. In the *Aware* stage a company knows about the business model concept and has designed and documented its own business model including its mentioned building blocks. In the *Defined* stage the company includes Business Model Innovation (BMI) into its strategic planning process. All relevant responsibilities in that regard are fixed and communicated internally. The *Proved* stage is characterized by already standardized BMI processes and specific projects to constantly enhance its business models. The *Established* stage has BMI as a central topic within the general innovation management of the company.

CRAVEzero showed that for many companies of the building industry in Europe the business model

concept is not widely spread yet. The project partners are therefore still in the early *Unknown, Aware or Defined* stage. Grappling with the Business Model Canvas can be insightful at this stage to get a first impression of the concept and understanding of the own model already practiced (PROMETA Unternehmensberatung GmbH, n.d.). By getting involved with the business model concept the companies move to the second stage (*Aware*). The description of the stages also indicates the next step to move forward towards a well-established BMI stage.

Due to the early stages of maturity the information provided about the different business models - especially in describing revenue streams and cost structure- have been only of qualitative nature.

3.5. LIFE CYCLE PHASES COVERED

To get an overview of the different business models that evolve around nZEBs the entire life cycle of a building needs to be analysed. This includes the phases of political decision-making, urban planning, planning, construction, operation, maintenance and renovation as shown in Figure 15. In each of these phases various stakeholder take part in the buildings life cycle while trying to capture value with their

business model. Within CRAVEzero the industry partners provided 17 different business models that are illustrated in orange boxes. It shows which life cycle phases are covered with business model description so far. The planning and construction phases are covered by the most business models. Additionally, one model is situated in the urban planning and three in the operation phase.

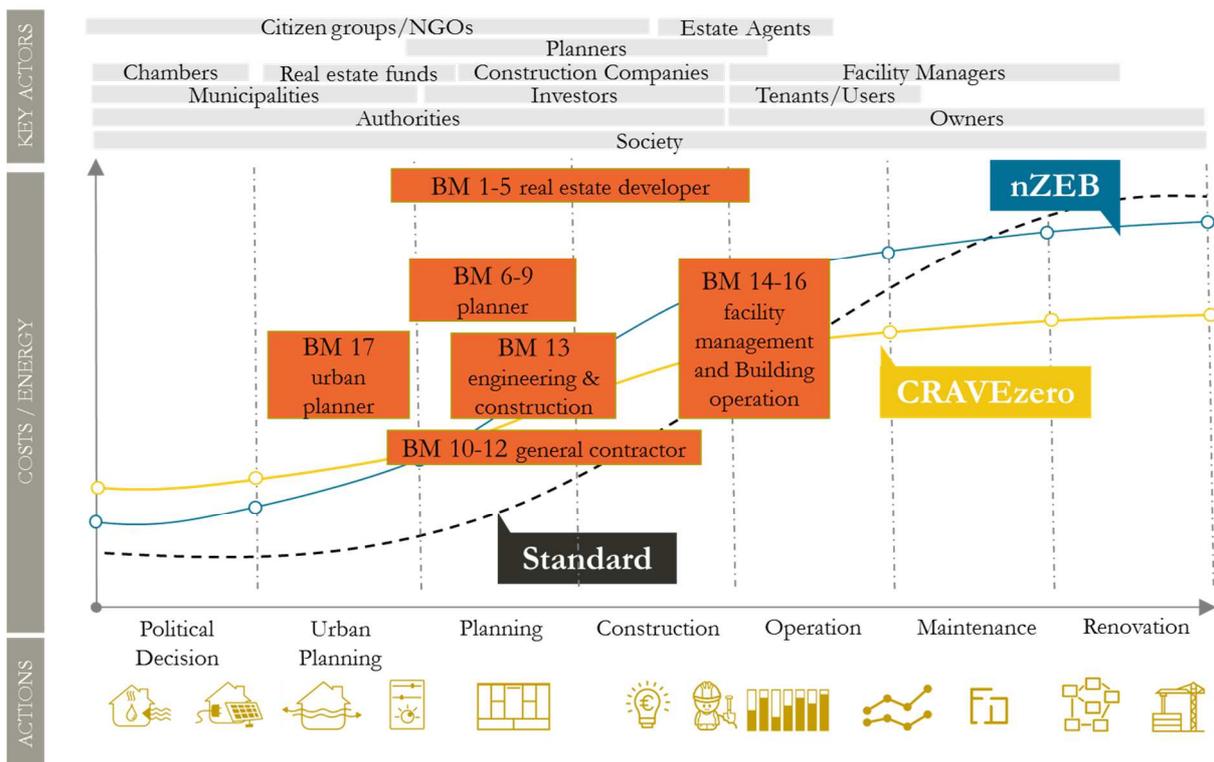


Figure 15: Life cycle phases of nZEBs

For further investigations it will be interesting to find and analyse business models of the political decision and the renovation phase. Also the maintenance phase has only been covered slightly.

These further areas may also create opportunities for business model innovation. Existing models could be complemented with services covering these phases.

3.6. ECONOMIC IMPACT

The evaluation of business models should include economic/quantitative information as an indicator of success and attractiveness for a company. Therefore, business models must quantify the additional effort, time and costs incurred for nZEB specific value propositions, relevant tasks, resources and partnerships. Due to the fact that most project partners have so far not defined their business model using the business model canvas this task has

been challenging. The information given in the relevant building blocks *revenue streams* and *cost structure* has, thus, not been sufficient for an in-depth analysis of the profitability. The main reason for the lack of detail in the information given has been stated to be the project dependency of costs and revenues. Both cannot be generalized for a business model as they vary strongly depending on the size, location, and number of variants of the project. In

order to analyze whether the business model or regarding project has in fact been profitable in the end, precise tracking of time/effort and costs spent on each task/resource etc. needs to be done. Furthermore, post calculations based on the monitored costs and the revenues made are necessary in order to evaluate the level of profitability. Conducting these evaluations the areas of unexpected additional costs can be spotted and enhanced in order to make the business model more efficient and financially viable. So far, in order to guarantee profits, companies have different approaches. By focusing either on economies of scale or financial mark-ups a profit is reached.

Economies of scale describe cost reductions due to high quantities. The more similar projects are conducted the less expensive each project becomes due to bargains on products, increasing experience resulting in more efficiency etc. On the other hand fixed profit mark-ups can be added to the price for the final offer in order to balance the extra-effort arising for a project. However, the extend of the additional effort in terms of time and costs needs to be known, which again leads to a need of cost-tracking and post-calculations. It needs these evaluations in order to prove and improve the profitability of nZEBs from a company's perspective.

3.7. CRITICAL SUCCESS FACTORS AND PITFALLS

In this chapter, the strengths and key factors (critical success factors) identified in the 17 provided business models are summarized and compared. From the identified success factors central pitfalls are derived. Critical success factors are those that have an impact in terms of

- 1) Quality,
- 2) Time,
- 3) Flexibility,
- 4) Cost and risk reduction (Schallmo, 2013).

The factors either contribute to a business success or limit the success potential. Identifying these factors is useful both for the enhancement of existing business models and for the creation of new innovative business models.

Comparing the 17 collected business models (see Figure 16 and Figure 17) of the project partners' patterns of common strengths and key factors become apparent.

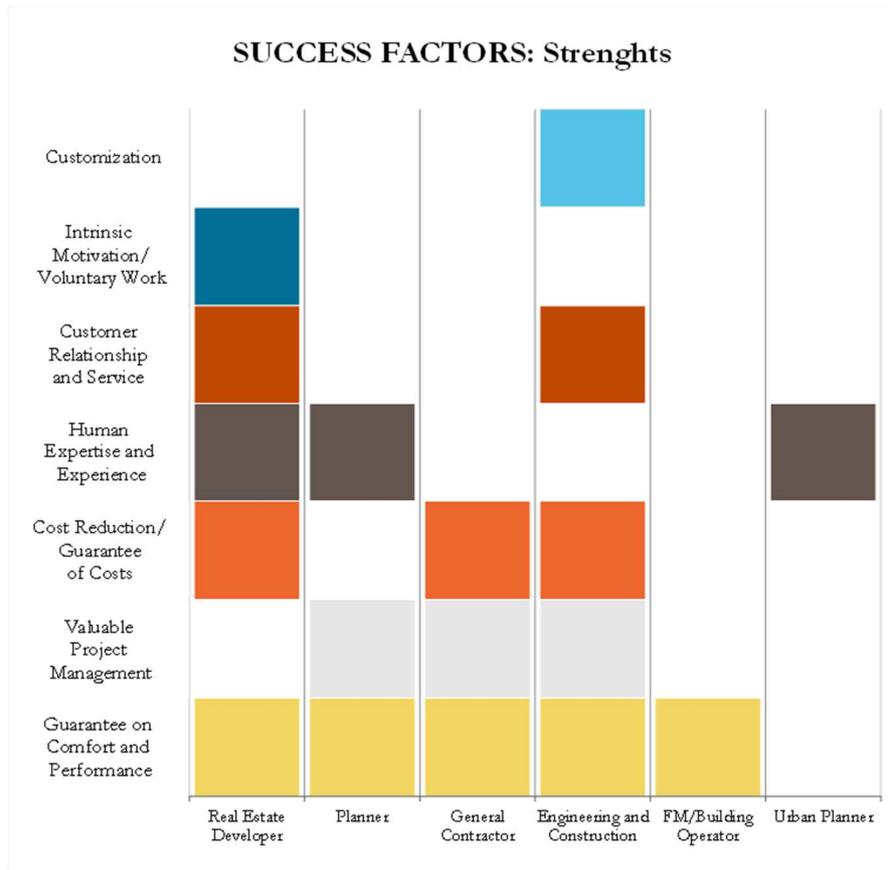


Figure 16: Cross-Analysis of BMs' strengths

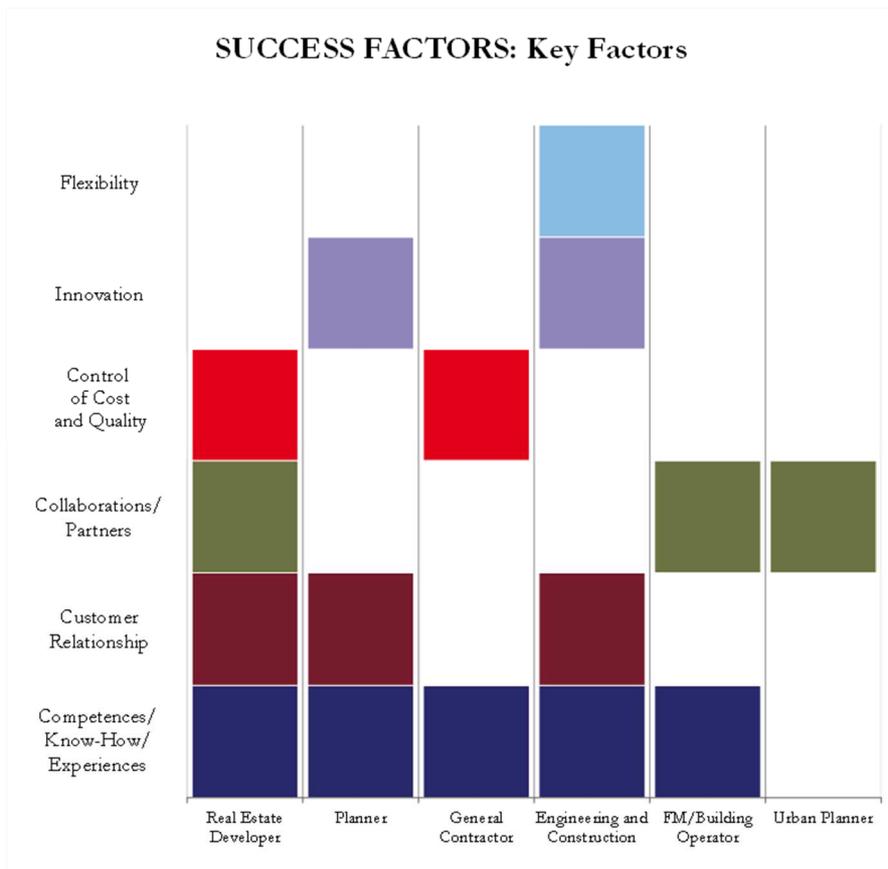


Figure 17: Cross-Analysis of BMs' key factors

The most recurring strengths and success factors have been: good references on previous projects and brand image, expertise in the field of activities as well as increasing experience and the provision of guarantees for the customers in terms of costs, performance and/comfort. Thereby the companies, regardless of which stakeholder perspective they have, are able to convince customer to purchase, win their trust and possible long term relationships. For Real Estate Developers, General contractors and Engineering and Construction companies' scalability (up/down scaling the resources depending on project size), widespread competencies (in-house) combined with easier control of design, time and costs as well as flexible handling and communication seem to be of importance.

Planners, on the contrary, focus their expertise on a certain planning phase. Moreover, innovative planning tools and the capability of using them efficiently are important success factors.

Based on the identified strengths and success factors one can derive several essential pitfalls. One project with a bad reputation can be a major challenge for a company as the BMs strongly depend on trust and good references on previous projects. Possible negative example projects can be e.g. if the desired energy demand is not achieved during oper-

ation, the comfort requirements are not met or the operation costs (energy and other) are higher than promised. Furthermore, the BMs strongly depend on the know-how of the personnel involved in the projects. Therefore the loss of essential know-how carriers – especially when know-how is concentrated on very few persons – can limit the ability of a company to deliver the promised values of a BM. Besides these internal challenges many nZEB BMs strongly depend on the collaboration of different partners and stakeholders. Losing a strategic partner for whatever reason can therefore also be a challenge.

Besides having collected the different business models and identifying the specific strengths and key factors, all CRAVEzero partners were asked to state the importance of further criteria for business models. This evaluation of success criteria is described in chapter 3.7.1.

Generally, in order to be successful with a business model, the customer needs to be attracted enough to actually make a purchase and the provision of the offer needs to be profitable for the company (Schallmo, 2013). In order to check for these two requirements the attractiveness portfolio (described in chapter 3.8) was used.

3.7.1.PRIORITIZATION OF CRITERIA

During a project meeting in Bolzano, in March 2018, the partners had the task to look at various possible evaluation criteria, to order and weight these and add further criteria that came to their mind.

All different groups of stakeholders found a different way of sorting the evaluation criteria. Furthermore, the weights varied slightly for each criterion depending on the stakeholders' perspective. In order to make the prioritization of criteria more comparable and easy to handle, these results were analyzed and three categories of criteria were built (strategic, economic, and ecological/social). Afterwards, sub criteria were allocated to these categories. Moreover, some formerly given criteria were combined to minimize the

overall amount. In a next step the new criteria had to be prioritized according to the partners' opinions. For this purpose a survey was prepared.

Table 3 summarizes the results of the survey. Arithmetic mean values of the varying indications of all project partners were built for each criterion. Local weights describe the weight of the criterion within its subordinated category. The overall weight of the category is, moreover, multiplied with the local weights of its criteria resulting in the different global weights. The global weights enable for the comparison of importance of criteria of different categories.

Table 3: Result of the Prioritization

CATEGORY	CRITERIA	LOCAL WEIGHT	GLOBAL WEIGHT
Strategic local weight	Lock-In	0.09	0.02
	Innovation	0.07	0.01
	0.17 Efficiency	0.10	0.02
	Complementarity	0.07	0.01
	Scalability	0.10	0.02
	Process Reliability	0.17	0.03
	Know-how	0.18	0.03
	Duration of implementation	0.23	0.04
Economic local weight	Net present value	0.06	0.04
	Internal rate of return	0.14	0.09
	0.60 Investment costs	0.18	0.11
	Profit	0.41	0.24
	Cash flow (operative)	0.21	0.13
Ecological/social local weight	Ecology/ Sustainability	0.21	0.05
	Reputation	0.47	0.11
	0.22 Job protection	0.32	0.07
Sum			1.0

Overall, the prioritization was strongly differing depending on the partner. This makes the mean values less significant. The partners stated that the weight depends strongly on the stakeholder perspective, type of project and region. Therefore, it is difficult to generalize the importance of different success criteria. Furthermore, the feedback was

limited to small number of stakeholders (project partners) and therefore the result is not representative enough for a general conclusion and application. Thus, the group decided not to use the results. It was stated to base on the attractiveness portfolio as a meaningful feedback instead, which is described in the following chapter.

3.8. ATTRACTIVENESS PORTFOLIO

The attractiveness portfolio is based on Schallmo (2013) and consists of four quadrants built within the two axis: internal and external attractiveness (compare Figure 18). The internal attractiveness describes the business model value from low to high attractiveness. The external attractiveness is described by the customer value also from low to high.

The customer value is illustrated with the level of problem-solution-fit. The internal attractiveness illustrates the level of financial viability of the business model (Business Model Value) and is in this work measured by a value map or if available by the operational profit margin. The situation of a business model within this portfolio gives guidance on how to proceed with it: discard, adapt or pursue.

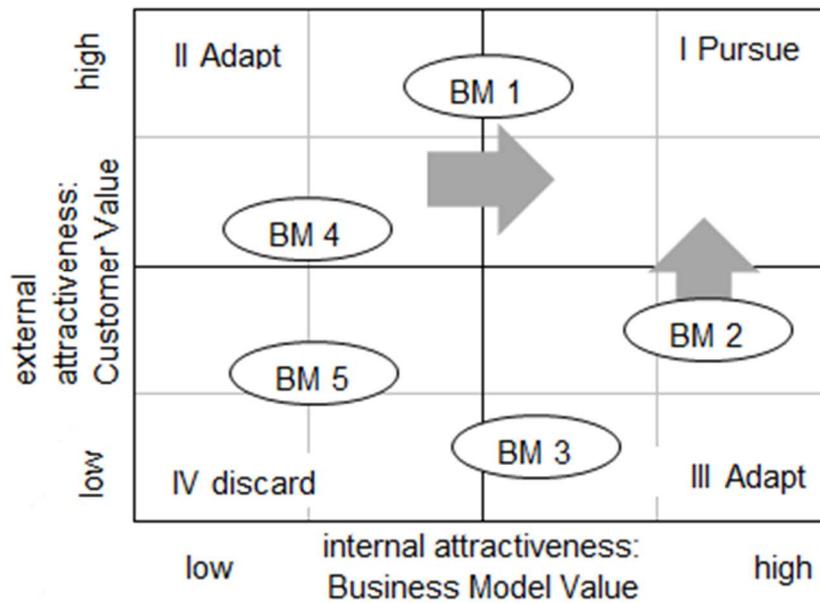


Figure 18: Attractiveness Portfolio following Schallmo (2013)

Business models that are situated in the first quadrant (*pursue*) are characterized by both a high customer and a high business model value. Therefore, they should be pursued. Business models of the second and third quadrant either have a high internal or external attractiveness. Due to that, they need to enhance the second value – e.g. by achieving cost reductions (increase of internal attractiveness) or enhancement of products and services (external attractiveness). If a business model has both a low internal and external attractiveness it is situated in the *discard-quadrant*. The effort to enhance business models in both fields would be too high, which is why they can be discarded (Schallmo, 2013).

All partners have been asked to rank the attractiveness of 13 delivered BMs by the partners (the additional four business models were handed in later). As a summarized result the business models have been ranked like shown in the next table.

To support this action a questionnaire has been produced in order to make a quick check using a limited number of questions to think about.

The problem-solution-fit describes the level to which the value proposition of a business model meets the wishes, desires and problems of the chosen customer segment. A sufficient level of problem-solution-fit indicates that customers are attract-

ed by the offer and are willing to pay for make a purchase.

Some relevant questions to assess the values are described below.

Customer Value

In order to evaluate the degree of problem-solution-fit the following questions can be used as indicators. The bigger the fit of value proposition (VP) and customer desire the bigger the customer value.

- How well does the VP help the customer to perform their job-to-get-done?
- How does the VP help the customers to be perceived as they would like to?
- How does the VP help to get the emotional feeling that they are seeking?
- How does the VP help in overcoming obstacles of getting their job done?
- Could the customer define the VP as too costly (in terms of money, time or effort)?
- Are there high barriers keeping the customers from adopting the VP (high upfront investment costs, a steep learning curve etc.)?

- How well does the VP solve situations that cause the customers' frustrations, annoyances and 'headaches'?
- Does the VP please the customers in terms of quality levels or are there any things they could wish for more/less? Are there additional features that would make their lives easier (flatter learning curve, more service, lower costs, more guarantees)?
- Does the VP offer what the customers are looking for most (good design, guarantees, specific or more features)?
- Do the revenues cover the costs (or even operational profit)?
- How easy is the access to loans from banks for this BM?
- Is the BM promising in terms of future business opportunities?
- Is there a noticeable profit?
- Does the BM help in the acquisition and retention of customers?
- Is the market and demand for the BM growing and therefore promising for the future?

Business Model Value

In order to evaluate the degree of the business model value the following questions can be used as indicators. The bigger the potential in regard to the financial viability is the better the business model value.

3.8.1.FEEDBACK

All partners ranked each business model based on the information given in the relevant BMC and the questions for the evaluation of the Business Model Value (BMV) and the Customer Value (CV). For this task only the first 13 business models were

looked at (BMs 1-4, 7-14, 17). The resulting values for BMV and CV have been arithmetically averaged for each BM. Figure 19 shows the resulting attractiveness portfolio that contains the BMs for the comparison.

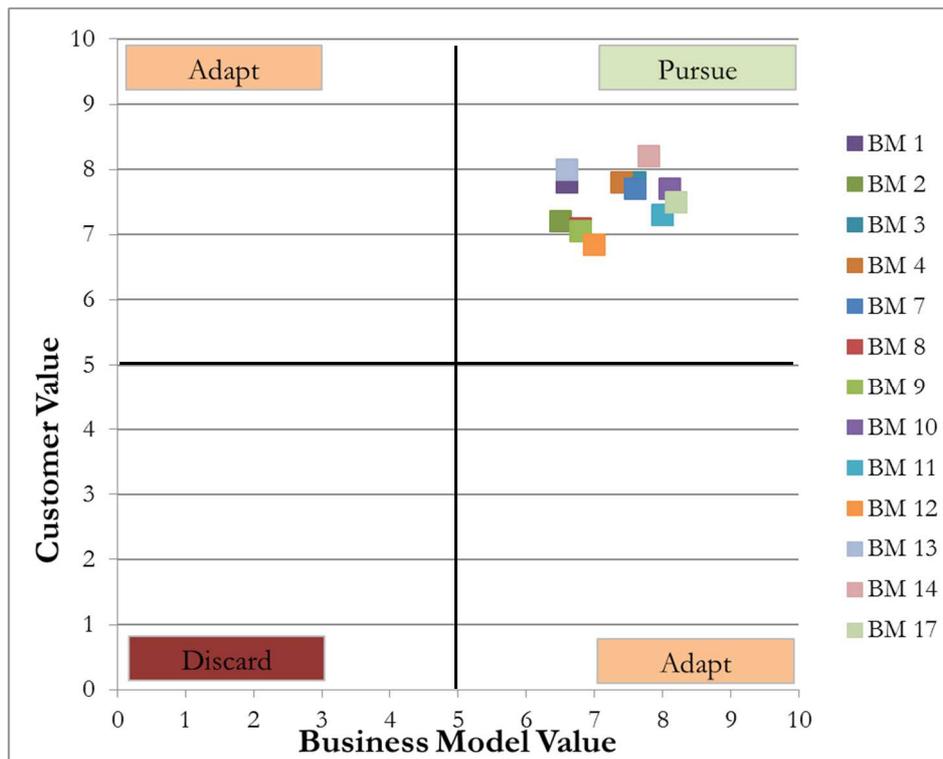


Figure 19: Summarized attractiveness portfolio

Based on the questions and information in the BMC given, the partners stated all business models to have both a high Customer and Business Model Value. According to these results, the business models don't need to be enhanced to be successful. Since the given business models are already implemented and used the result seems reasonable.

However, the evaluation was done by the CRAVEzero partners themselves. It would be interesting to let the business models be analyzed externally making use of the given methodology or to consult the regarding customers for their opinions.

3.9. BUSINESS MODELS OF OTHER STAKERHOLDERS

To enlarge the business model repository, the CRAVEzero project partners will check their work environment and respective country envi-

ronment and add additional business models. This repository will be created during Q4 2018 and Q1 2019.

4.LINK TO OTHER WPS

4.1. LINKS TO WP 2 LIFE CYCLE COST OF NZEBs

It is useful for stakeholders to know how their costs and revenues of their presented business model are related to the overall life cycle cost of a building. This can help to evaluate the value of the offered services in relation to the whole building life cycle. This reference is very often the

basic reason to explain the client why the offered service creates a win situation.

The comparison of business as usual approaches to the NZEB approach offers also a cost and revenue difference. Cost and revenue streams of new business models are situated within this difference.

4.2. LINK TO WP 7, CRAVEZERO PINBOARD

One aim of the CRAVEzero project is to facilitate the design and implementation of nearly Zero-Energy Buildings (nZEBs).

With that perspective it is useful to learn from realized projects how they implemented their business. CRAVEzero will offer via the pin board web tool information about creating a business in the nZEB environment. Business models will be

presented under a special heading. It is planned to offer the creation of simplified business models by using pre-defined modules based on the described work in this WP 5. The pin board will be created in WP7. A first impression can be found on the web page of the project: <http://www.cravezero.eu/development-of-new-business-models/>.

5.DISCUSSION

In this report, a method for the holistic evaluation of business models has been shown. This was done by identifying the requirements for a business model to be successful (qualitative and quantitative). Adapting existing tools to evaluate these factors the method has been put together. It gives established companies a good overview

of how promising their business model is according to the necessary factors and if it is, in the end, worth adapting, discarding or pursuing. In applying the well-established Osterwalder Business Model Canvas the companies contributing to CRAVEzero got to describe their implemented nZEB business models becoming aware of the

underlying logic and interrelation of different factors.

It was shown that different stages of maturity of business models can be found within the described business models. Some models are already well established and are in use during daily business. Some models are in a developing phase where cost and revenue structures are in development. Depending on the maturity of the business model, adaptations can be established to improve the models.

By following each step of the evaluation method, points for improvement can be identified helping the enhancement of the business model or the creation of completely new ones, which will be done in a second phase of the CRAVEzero project.

The collection of 17 different nZEB business models (provided by CRAVEzero industry partners) gave an overview of the variety of different stakeholder perspectives and approaches to capture value in nZEBs' life cycle.

In analysing the business models, common strengths and key factors have been identified. As described above, differences in regard to geographic clusters could not be found. The structure of BMs is more depending on the stakeholder perspectives and activities. Nevertheless, there can be differences in the details of a business model depending on national or even regional laws, regulations and/or support schemes. However, critical points, insufficient or insignificant information and results have been revealed. Especially the difficulties for the evaluation of the profitability need to be mentioned here which can be allocated to the early maturity stage of the business models. It is advisable to track time and costs spend on the provision of the regarding offer. Furthermore, post-calculations will be helpful in identifying additional costs and efforts and enhancing the business models in regard to efficiency and financial viability.

However, the developed evaluation method enables for a holistic first overview of the business models' success potential and can be extended by the user of the method if necessary. Questionnaires for parts of the method enhance its usability and help the user get familiar with it. Nonetheless, applying the method and evaluating a

business model need some time within a company to discuss and develop all relevant topics. It requires intense examination with the matter. Furthermore, the potential of a business model is not static. With changing market conditions, technological advancements and changing customer desires, the potential can increase or decrease. Therefore, business models need constant monitoring and adaptation (Business Model Innovation).

The results of this first step can be used to enhance existing and develop new business models related to nZEBs. The focus in future tasks will be on creating business models that involve different stakeholders decreasing costs and risks for all of them including the prospective customers.

6. TERMINOLOGY

6.1. TERMS AND DEFINITION

ACQUISITION COST

All costs included in acquiring an asset by purchase/lease or construction procurement route, excluding costs during the occupation and use or end-of-life phases of the life cycle

CAPITAL COST

Initial construction costs and costs of initial adaptation where these are treated as capital expenditure

DISCOUNTED COST

Resulting cost when the real cost is discounted by the real discount rate or when the nominal cost is discounted by the nominal discount rate

DISPOSAL COST

Costs associated with disposal at the end of its life cycle

END-OF-LIFE COST

Net cost or fee for disposing of a building at the end of its service life or interest period

EXTERNAL COSTS

Costs associated with an asset that are not necessarily reflected in the transaction costs between provider and consumer and that, collectively, are referred to as externalities

MAINTENANCE COST

Total of necessarily incurred labour, material and other related costs incurred to retain a building or its parts in a state in which it can perform its required functions

NOMINAL COST

Expected price that will be paid when a cost is due to be paid, including estimated changes in

price due to, for example, forecast change in efficiency, inflation or deflation and technology

OPERATION COST

Costs incurred in running and managing the facility or built environment, including administration support services

REAL COST

Cost expressed as a value at the base date, including estimated changes in price due to forecast changes in efficiency and technology, but excluding general price inflation or deflation

NET PRESENT VALUE

Sum of the discounted future cash flows

6.2. ACRONYMS

BM	Business Model
BMV	Business Model Value
CHP	Combined Heat and Power
CV	Customer Value
PV	Photovoltaic
COP	Coefficient of performance
DHW	Domestic hot water
DSM	Demand side management
HVAC	Heating, ventilation and air conditioning
NZEB	Net zero energy building(s)
nZEB	Nearly zero energy building(s)
RES	Renewable energy sources
max	Maximum
min	Minimum
CoC	Cost of Capital
LCC	Life-Cycle Costs
LCCA	Life-Cycle Costs Analysis
WLC	Whole-Life-Cycle Costs
NPV	net present value
VP	Value Proposition

6.3. NORMATIVE REFERENCES

DIN 18960 Nutzungskosten im Hochbau

DIN 276 Kosten im Bauwesen

DIN EN 15221 Facility Management

ISO 41001:2018 Facility Management

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