

D5.2: Existing nZEB 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
WWW.CRAVEZERO.EU

Co-funded by the Horizon 2020

Framework Programme of the European Union



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D5.2: Existing nZEB business models

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February, 2019

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FOREWORD

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

The overall aim of this work package is to screen the European markets for interesting already existing business models for nearly Zero-Energy Buildings (nZEBs) and the general market-uptake potential in the major markets. Moreover, the collected business models are examined in terms of how they can be characterised and what makes them successful. This knowledge builds a reliable basis for the generation of new business models. Innovative and reliable business models are needed in order to speed-up the market-uptake of nZEBs. They will give reliable information and profitability for all stakeholders involved along a building's life cycle. They make investments more secure by reducing uncertainties.

In the past report “D. 5.1 Typology canvas of business models” the term business model and its underlying logic has been introduced. Moreover, a business model repository has been given. It showed 17 different nZEB related business models belonging to the partners of the CRAVEzero project. The detailed descriptions are giving possible examples for business ideas in different phases

along nZEBs' life cycles and from various possible stakeholder perspectives. This work, as an extension of the previous one, aims to illustrate nZEB business models found in all major European markets and life cycle phases such as the political decision making, urban planning, building planning and construction, operation, facility management, maintenance, recycling, re-use etc.

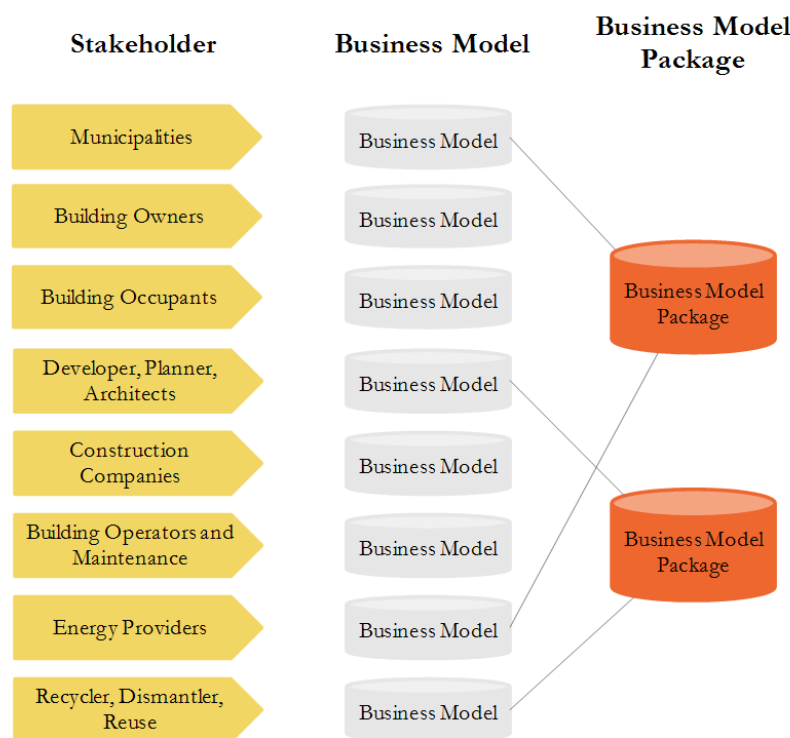


Figure 1: Business Model Overview(source: Fraunhofer ISE)

On the website www.cravezero.eu/development-of-new-business-models/ interested stakeholders involved with nZEBs can find inspiration and facts about what makes these business models successful. Based on that, business models can be adjusted, innovative business models can be developed or business model packages (compare Figure 1), consisting of two combined business models can be created to make them more efficient and profitable.

ACKNOWLEDGMENT

Large parts of the report are based on information of business models that belong to companies which are not contributing to the CRAVEzero project. The information have been retrieved from the respective websites. Therefore, it cannot be guaranteed that statements made in the course of this report are entirely correct.

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EXECUTIVE SUMMARY

This report features a description of business models that contribute to the market acceleration of nearly Zero-Energy Buildings (nZEBs) in different European markets. The business models are described in a profile-manner (see Figure 2 and appendix) considering the following parameters:

- value proposition,
- customer segment
- customer relationship,
- activities and capabilities,
- revenues,
- costs,
- strengths and key factors,
- maturity and
- Placement along the value chain of nZEBs.

The business models belong to different stakeholders along a building's life cycle. The key findings for each parameter of the business models are filtered conducting a comparative analysis. It sheds light on the characteristics that make business models successful, differences, maturity stages of the existing business models and the life cycle phases covered extensively. Consequently, it can be extracted at which point of the life cycle new business models can make sense and contribute to a diverse market, which characteristics are likely to make it successful and which possible cooperation of stakeholders could cause win-win-win situations for all.

Some features are common to the various business models analysed or very recurring. As to the value proposition, the key features are sustainability and energy efficiency. In most cases, a strong relationship with the client is

strategic, because it is necessary to build a relationship of trust in the face of the expenses that will have to be incurred.

For this purpose one of the most relevant activities is customer service and communication

Besides this the most important and essential activity for all the stakeholders is the design/ engineering and development of projects/ buildings.

With regard to the important issue of cash-flow, the main revenue is the sale of the asset, while the main costs incurred are related to personnel expenditures, which are always present. The most recurring strengths and success factors are widespread competencies, Know-how, innovation & sustainability as well as guaranteed prices/performances. All stakeholders can find in this document a guide for optimal management of their business model.



Figure 2: Layout of the prepared Business Model Profiles

CONTENTS

1. Introduction.....	4
1.1. Objective.....	4
1.2. Tasks.....	5
2. Methodology.....	6
2.1. Limitations	6
3. Business model repository.....	7
4. Results.....	9
4.1. Value Proposition	9
4.2. Customer Relationship.....	10
4.3. Customer Segment.....	12
4.4. Activities and Capabilities.....	12
4.5. Revenues.....	13
4.6. Costs.....	14
4.7. Maturity Stages.....	16
4.8. Strengths and Key Factors.....	17
4.9. Life Cycle Phases Covered.....	19
4.10. Learnings, Insights, Saliences.....	20
5. Link to other WPs.....	20
5.1. Links to WP 2 Life Cycle Cost of nZEBs.....	20
5.2. Link to WP 7, CRAVEzero Pinboard	21
6. Discussion.....	21
Terminology	23
6.1. Acronyms.....	23
6.2. Normative References.....	23
References.....	23
7. Appendix	24

LIST OF FIGURES

Figure 1: Business Model Overview.....	3
Figure 2: Layout of the prepared Business Model Profiles.....	1
Figure 3: Comparative analysis - Value proposition.....	10
Figure 4: Comparative analysis - Customer relationship.....	11
Figure 5: Comparative analysis - Customer segment.....	12
Figure 6: Comparative Analysis - Activities and Capabilities.....	13
Figure 7: Comparative analysis – Revenues Streams.....	14
Figure 8: Comparative analysis - Cost structure.....	15
Figure 9: Maturity stages of the implementation of business model concept in companies (following (PROTEMA Unternehmensberatung GmbH)).....	16
Figure 10: Strengths and Key Factors as factors of success for the Business Models.....	18
Figure 11: Life cycle phases of nZEBs and Business Model allocation.....	19

LIST OF TABLES

Table 1: Parameters of the business model profiles and their description	6
Table 2: Analyzed business models and their categorization.....	7
Table 3: Additional nZEB business models analyzed	8
Table 4: Description of the business models' possible Value Propositions.....	9
Table 5: Description of the business models' customer relationship.....	11

1. INTRODUCTION

Some of the main obstacles of nearly Zero-Energy Building's market-uptake have been identified to be the comparably high investment costs and the lack of business models that are both reliable and economically viable for companies (Tolaiyte et al., 2016). Thus, in order to allow for the nZEB market acceleration, solutions and innovative business models need to be developed. They should be reliable and predictable in terms of costs and thereby reduce a company's uncertainties and economical risks. Simultaneously, these models should be efficient enough to provide offers at reasonable price or/and with convincing benefits for customers.

The aim of this report is to give an extensive overview on the different kinds of business models that exist in the major European markets today. Therefore, the CRAVEzero project partners contributed descriptions of both their own and additional business models found on the internet or collected in

interviews and workshops. A comparative analysis of the findings is conducted in order to evaluate whether there are patterns in regard to different stakeholder perspectives that indicate success potential. Different stakeholder perspectives can, for instance, include planner, real estate/urban developer, construction companies, general contractor, facility manager building operators. Thus, in this report the business models introduced are actually practiced ones instead of general categories and therefore give more insight.

Based on the results generated with the analysis it becomes clearer which features are useful to attract customers, which partnerships can be reasonable to create efficient win-win-situations and which phases along nZEBs' life cycle are not taken care of yet. This knowledge then serves as a basis for the generation of new business models.

1.1. OBJECTIVE

A business model is a simplified depiction of the way a complex and profit-oriented system generates, delivers and captures value. It illustrates the systems essential elements. With the term being relatively new in academic discussions and not formally defined yet, business modelling has not reached sophisticated maturity in many companies. As a matter of course, those companies' developed certain business ideas and sections that work successfully. However, they often have not defined a business model including the necessary parameters. Usually, looking at one's own business from that

perspective can be eye-opening. Gathering business ideas of companies, as it is done for this report, has a similar effect. It broadens the horizon of what is possible and in which manner. Most importantly, though, it spots business areas that are not covered yet or parts of business models that either help companies to be successful or cause the opposite. Thereby, collecting and analyzing existing business models are essential for the subsequent step of generating innovative business models making it the objective of this report.

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.

2.METHODOLOGY

Relevant parameters to describe existing nZEB business models have been collected in a standardized blank profile to provide a systematic data format for the analysis (see Table 1).

Table 1: Parameters of the business model profiles and their description

PARAMETER	DESCRIPTION
Value Proposition	Products, services, features, benefits creating value for the customers
Customer Relationship	Intensity of customer-provider relationship, channels to reach the customers
Customer Segment	Typical Customer group that the product/services is directed to
Activities and Capabilities	The most important activities a company needs to conduct in order to provide the offer and necessary related resources
Revenues	Type of streams a company generates revenues with
Costs	Most important expenditures that the company incurs in for the provision of the offer
Maturity	Stage a company is situated in with regards to how elaborated and integrated a business model is.
Key Factors and Strengths	The most important factors and strengths that make the business model work successfully.

All project partners used this profile to describe business models of companies in their home countries and other major European markets as well as some of their own business models. In the former case, descriptions are based solely on information found on companies' websites rather than insider knowledge. Some of the external companies have provided information in written or oral interviews.

The parameters are mainly based on the deliberations of Osterwalder and Pigneur (2010) and their so called business model Canvas.

After collecting information on the business models of various phases along nZEBs life cycle, a comparative analysis is conducted, with the aim of identifying repetitive patterns common strengths and key factors. Furthermore, regional differences (if given) are shown. In the end, the key findings of the analysis are described. The discussion afterwards summarizes all results, reflects them critically and points out steps for following work packages.

2.1. LIMITATIONS

All additional business models found in European markets have been described by a third party (CRAVEzero project partners). These descriptions are based on the information found on the different companies' websites, and only occasionally on interviews and workshops with subjects from those companies. This work therefore does not claim to provide all information about the business models, nor can the reliability of the information given online be guaranteed apart from being subject to interpretation.

However, the descriptions aim to provide an overview of different existing business models in various major markets (Germany, France, Italy, Sweden, Austria, Great Britain, Belgium, and Netherlands) and the variety of offers provided.

3. BUSINESS MODEL REPOSITORY

In Deliverable 5.1 of the CRAVEzero project a list of 17 business models, provided by the project partners, has been developed. The business models are mostly provided by the contributing companies and have therefore been described based on first-hand information and experience. Table 2 summarizes these business models, their origins and stakeholder perspectives. More detailed information can be found in the mentioned deliverable 5.1 on the CRAVEzero website, the companies' websites and in the appendix of this report.

Table 2: Analyzed business models and their categorization

Stakeholder Perspective	BM No	Country	Website
Cooperative in Real Estates	BM 5	AT	https://diewogen.at/
Energy Service Company	BM 16	AT	https://www.helios-sonnenstrom.at/photovoltaik
Engineering and Construction	BM 13	IT	https://morettispa.it/
Facility Manager	BM 14	FR	https://www.bouygues-construction.com/
General Contractor/ Developer	BM 2	SE	https://www.skanska.se/skanska-in-sweden-in-brief/our-offer/
	BM 3	SE	https://www.skanska.se/skanska-in-sweden-in-brief/our-offer/
	BM 10	FR	https://www.bouygues-construction.com/
	BM 11	FR	https://www.bouygues-construction.com/
	BM 12	IT	https://morettispa.it/
Planner	BM 6	FR	https://www.atp-sustain.ag/de/startseite/index.htm
	BM 7	AT/ DE	https://www.atp-sustain.ag/de/startseite/index.htm
	BM 8	AT/ DE	https://www.neueheimattiol.at/
	BM 9	AT/ DE	https://www.ir-gruppe.com/de
Real Estate Developer	BM 1	DE	https://www.koehler-und-meinzer.de/
	BM 17	FR	https://www.bouygues-construction.com/
User/owner	BM 15	AT/ DE	/
Urban Planner	BM 4	FR	https://www.bouygues-construction.com/

In addition to the 17 given business models, the project partners have been asked to search for, collect and describe more nZEB business models of the European markets, especially of their home countries. This chapter will give an overview of the additional collected models that are summarized in Table 3. In this regard, the challenge was to find business models that come from as many different stakeholder perspectives as possible to describe the full range of possible options.

Table 3: Additional nZEB business models analyzed

Stakeholder perspective	BM No.	Country	
Certifier	37	DE	http://bau-irn.de/bnk-zertifikat/bnk-system
Consultancy	21	NL	https://www.c2cexpolab.eu/de/homepage-deutsch/
	40	NL	https://www.madaster.com/en
Energy Service company	30	DE	https://www.enbw.com/solar
	38	DE	https://www.polarstern-energie.de/
	39	DE	https://sonnen.de/sonnencommunity/
	49	FR	https://www.enedis.fr/demonstrators
	50	FR	https://www.sunchain.fr/
Engineering and Construction Company	18	DE	https://www.schwoererhaus.de/
	20	BE, LU	https://www.progroup.eu/
	27	FR	https://www.schneider-electric.com/ww/en/
	33	AT	https://www.kohlbacher.at/
	42	IT	http://www.biohaus.it/
	43	IT	https://www.domus-green.com/
	44	IT	https://www.kampa.it/
	54	DE	http://www.enev-aktuell.de/index.html
Facility manager	41	USA	https://openworksworld.com/
	51		Pending
	52		Pending
Financier	35	DE	Pending
	36	DE	http://www.bafa.de/DE/Energie/energie_node.html
General Contractor/ Developer	45	SE	https://www.skanska.se/vart-erbjudande/vara-projekt/218987/Kronodal-Omtankens-hus,-Hollviken/?Query=kronodal
	46	SE	https://www.boklok.se/
Planner	53		Pending
	57	IT	http://www.3isrl.it/
Political Entity	24	FI	http://figbc.fi/en/building-performance-indicators/
	28	USA	https://www.gsa.gov/about-us
Promoter & Information Provider	25	NL	http://www.greendeal-circulairegebouwen.nl/index.php
	56	DE	http://foerderdata.de/
Research Entity	26	NL, DE	http://www.epea.nl/home/ , http://www.epea.com/de/startseite-de/
	58	IT	http://www.eurac.edu/en/research/technologies/renewableenergy/Pages/default.aspx
	60	AT	https://www.aee-intec.at/index.php?params=&lang=en
Trading Platform	22	GB	https://www.globechain.com/
	23	USA	http://planetreuse.com/
Vendor	19	BE	https://rotordc.com/new-partnership-galtane/
	29	CH	https://www.brixa.net/produkte/autarke-systeme/autarkes-haus/solarbatterien/
	31	FR	https://www.ehtech.fr/
	32	FR, DE	https://dualsun.fr/de/
	34	DE	https://www.viessmann.de/de/vishare-energy-community.html
	48	FR	https://stimergy.com/en/
	55	DE	https://www.senertec.de/die-dachs-familie/
Non-Profit	59		https://living-future.org/

4.RESULTS

In this chapter the results of the comparative analysis based are shown and discussed. They are based on the information of the business model profiles (see appendix). The analysis is done in order to point out similarities and differences of the collected business models. Thereby, potential success factors and repetitive patterns of specific stakeholders can be identified. For the different parameters integrated in the business model profiles the resulting graphics of the comparative analysis list all different business models (x-axis) and various answer-categories that possibly inherent in the business

models (y-axis). If they are marked in colours they play a role for the respective business model. On the right side of each graphic it is indicated how often a certain category is named in the different business models compared to other categories. In the following sub chapters each profile parameter is analysed separately. First the different answer-categories for each parameter are described for a better understanding. Afterwards a graphic indicates the distribution of categories of the parameters over the collected business models.

4.1. VALUE PROPOSITION

The value proposition describes products and services and how they create benefits for customers either by relieving pain or creating gains and helping customers get a certain task done. In regard to nZEBs the characteristics that are part of the business models value proposition (left side of the graphic) are described in Table 4.

Table 4: Description of the business models' possible Value Propositions

Characteristic	DESCRIPTION
Social Responsibility	E.g. making a service/ offer available for everyone (good prices), supporting projects in poorer regions of the world.
Residual Value/ Durability	E.g. increased when there's a possibility of selling used building parts. The durability of a building is increased with higher life expectancies of technical equipment and building parts or longer guarantees
Customization	Each customer is looked at separately and special wishes in regard to a service product are taken into account. The product/service is not standardized.
Know How	The company has plenty of know-how and uses it as a basis for a profound service and or offers know how/information as a primary product/service.
Future Risk Reduction	The offer has a positive impact on the risks: either by giving guarantees or by reducing possible sources for risks.
Service	a personal and direct relationship, informative websites and informational events that all lead to customers sticking to a company/brand and long-term relationships
Cost Reduction	reducing investment costs (indirect by offering financial aid) or operation costs over a buildings life time
Comfort/ Innovation	Innovative technologies, processes, ideas, reducing worries for customers
Energy Performance	Energy efficiency, reducing energy demand of buildings, using more sustainable energies
Quality	Due to high quality materials or very experienced workforce.
Green Label/ Sustainability	the certification and fulfilment of energy efficiency standards, usage of renewable energies and sustainable materials

Figure 3 shows the results of the comparative analysis of the different value propositions offered within the business models collected. The most common features of the value propositions have been identified to be Green labels and sustainability; comfort and innovation, (energy) cost reductions and efficient energy performance as well as a focus on good customer services. All of these fea-

tures can be found in business models of different stakeholder perspectives. Features like customization, the increase of a building's residual value and products' durability, and a focus on social responsibility within a company's offer are less common and depend on the stakeholder offering a service/product.

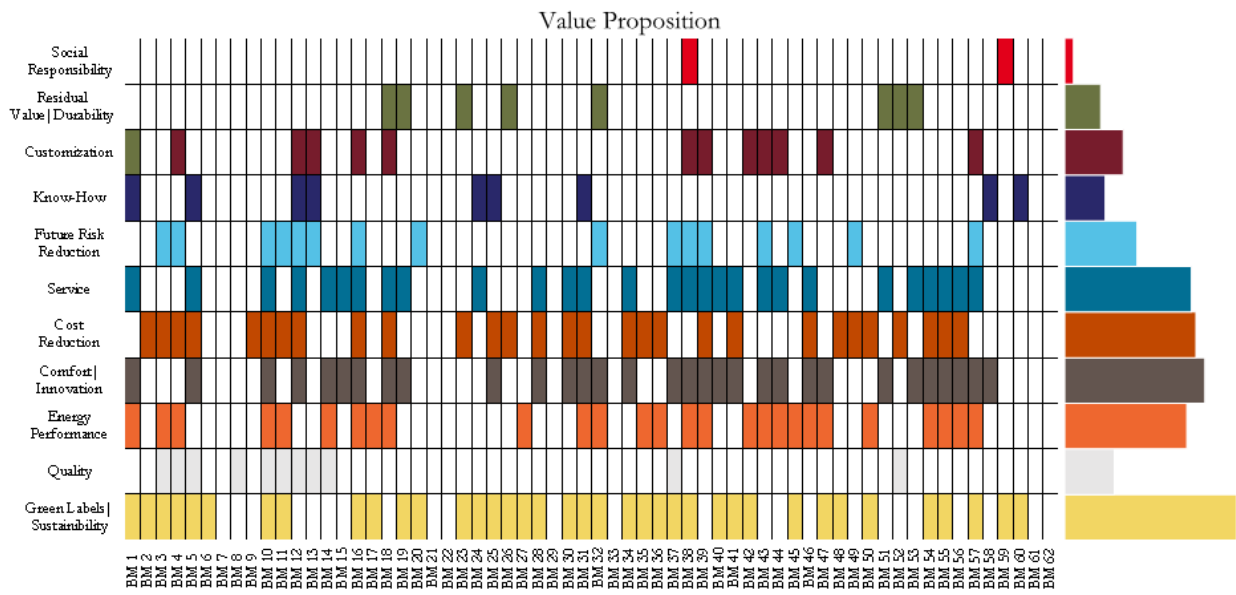


Figure 3: Comparative analysis - Value proposition (source: Fraunhofer ISE)

4.2. CUSTOMER RELATIONSHIP

The customer relationship describes how a company builds up and retains a relationship with their customers, how intense it is and how customers get in touch with the company. The characteristics given for this parameter can be found in Table 5.

It became apparent that almost every business model builds on personal relationships with their customers (see Figure 4). This can be explained with the high degree of personal consultancy and trust required for customers to invest large amounts of money. It also goes along with the previous findings that showed a common focus on strong customer relationships. Therefore it is very likely, that especially stakeholders like developers, planners and construction companies tend to stress personal relationships as they play crucial roles in critical building phases.

Trust is built and obtained making use of different channels. Most common in this regard are online channels (websites). Many business models make

use of references (e.g. on the companies' websites) or/and marketing and other communication channels such as social media. It seems that digital media is already inevitable to reach today's customers even in the building sector. Additionally, some companies offer informative events, others rely on mouth to mouth advertisement and their brand name. For (semi-) public contracts the contact is made by bid solicitation according to European regulations. Comparably few companies aim for long-term relationships with their customers. Those are usually companies that offer various tasks along a building's life cycle and want to make sure the customer stay loyal. Others act according to contractual obligations which often end with the sale of a project/building/service which usually is a cheaper option and enables companies to offer services at lower prices making them more competitive.

Table 5: Description of the business models' customer relationship

Characteristic	DESCRIPTION
Social Media	E.g. Facebook, Twitter etc.
Mouth-To-Mouth Advertisement	Former customers talk about their good experiences with a company
Long Term Relationship	Companies try to keep in touch with their customers even after the contract ends, or a product was sold by after sales services or additional services offered for further life cycle phases of a building
Co-Creation	Customers get the chance to take part in the production, design by giving references on previous projects
Online Channel	websites
Informative Material	Brochures, flyer, pdf documents, websites
Anonymous	Instead of having a personal relationship with customers the relation remains anonymous; no dedicated customer support, no long-term relationship
Internal	Internal communication due to being one's own customer.
Bid Solicitation/ Tendering	For (semi) public contracts according to European law: the 'best' bid gets the acceptance
Informative Events	The company holds regular events where possible new customers are invited to ask questions and get informed about upcoming projects
Contractual Relation	The relationship is solely based on the contractual obligation and rather anonymous
Personal Relation	The customer gets a dedicated customer service with personal contact to build trust.

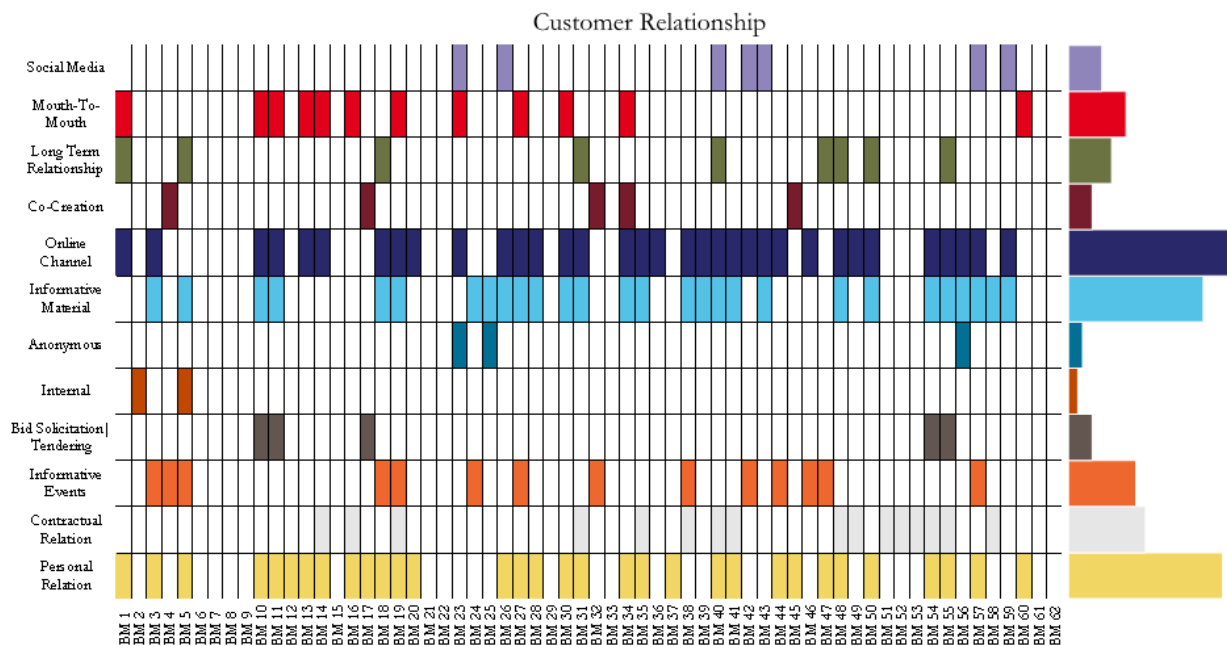


Figure 4: Comparative analysis - Customer relationship(source: Fraunhofer ISE)

4.3. CUSTOMER SEGMENT

A customer segment describes the group of people that a company typically tries to attract with their offers. Those groups can be categorized by location, demographic, financial or functional characteristics. For this work, functional characteristics have been chosen. As illustrated in Figure 5, building

owners are the most frequently mentioned segment. Often they are the final users as well. Other than that, companies have been mentioned quite often as well as (public and private) investors and municipalities.

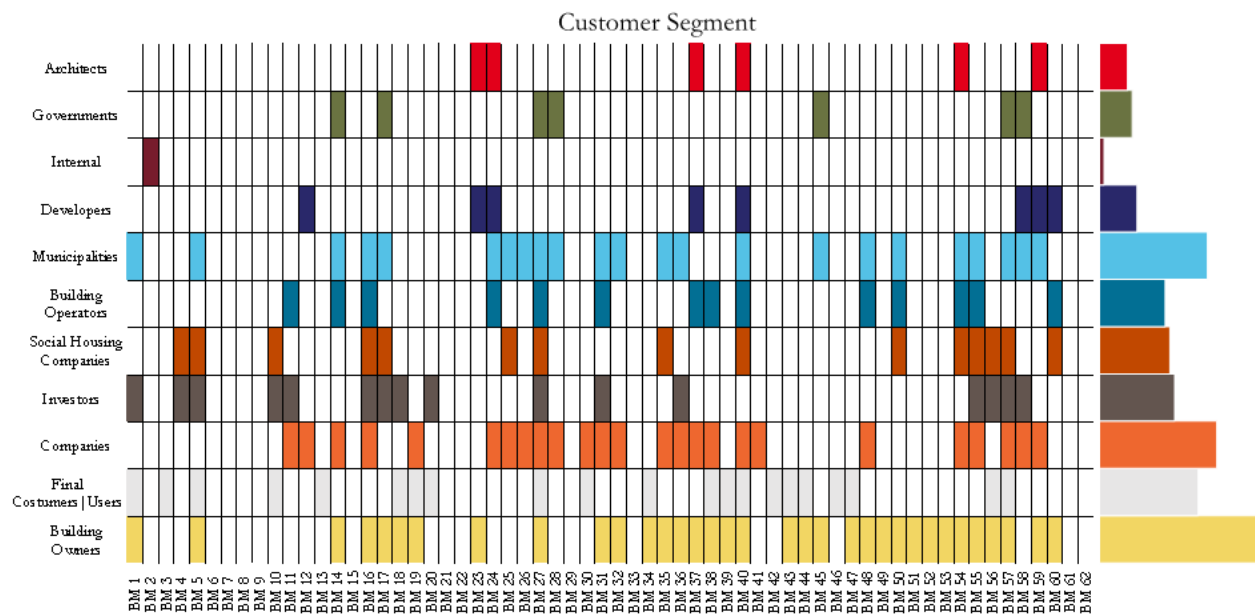


Figure 5: Comparative analysis - Customer segment(source: Fraunhofer ISE)

4.4. ACTIVITIES AND CAPABILITIES

Activities and Capabilities are the essentials required for companies in order to provide their offers. Here, both tasks that need to be fulfilled as well as required facilities are included. The most common activities in the provision of nZEB related value propositions are the design/engineering and development of projects/buildings (as shown in Figure 6). These are the main tasks of the most often analysed stakeholders. In accordance with the focus on customer service, both the customer service itself as well as communication and intermediation (with different relevant stakeholders) are part of the most important activities. Other than that consultancy and construction works have been

mentioned comparably often. Less common are services such as dismantling, reuse and renovation, facility management, certifications, prefabrication of building parts and grid services. This reflects only the limited amount of business models that have been analysed. Nonetheless, these services may be interesting for the generation of new business models as they are likely to differentiate companies from competitors. Another option is to search for permanent partners that provide these ‘additional’ services and make use of innovative “business model packages” that both partners and the customer benefit from (compare Figure 1).

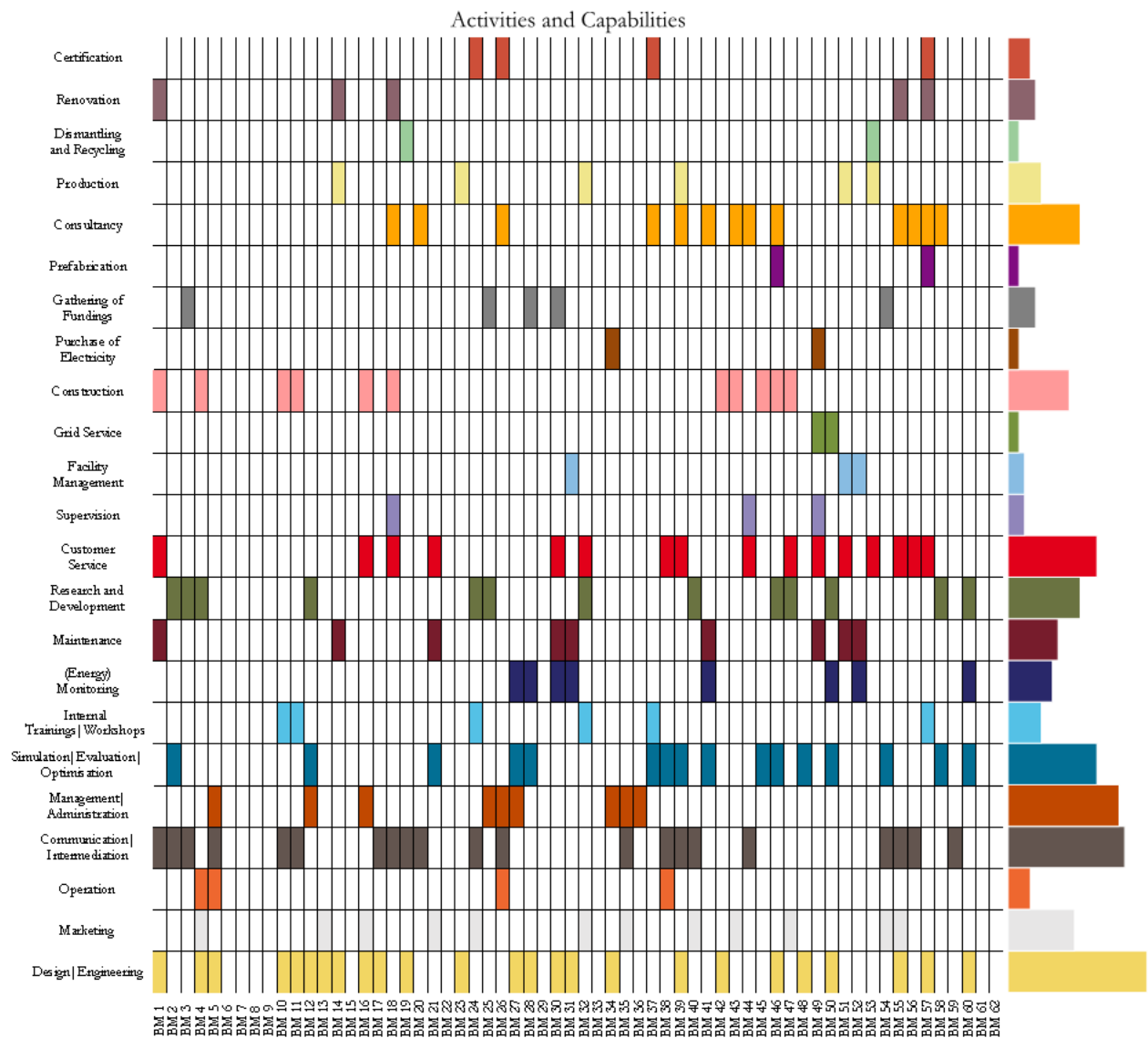


Figure 6: Comparative Analysis - Activities and Capabilities (source: Fraunhofer ISE)

4.5. REVENUES

The parameter ‘revenue streams’ describes how a company aims to capture value with their offer. There are different options (as shown in Figure 7) like asset sales, leasing, brokerage fees or transaction revenues based on architect/ engineering/ construction services or additional services such as administration, management, maintenance or con-

sulting. Asset sales have been mentioned most, followed by additional services for administration, management and maintenance. Another commonly used stream is the Energy Performance Guarantee (EPG) contract (mostly from general contractors and building operators) as well as leasing, rent and usage fees.

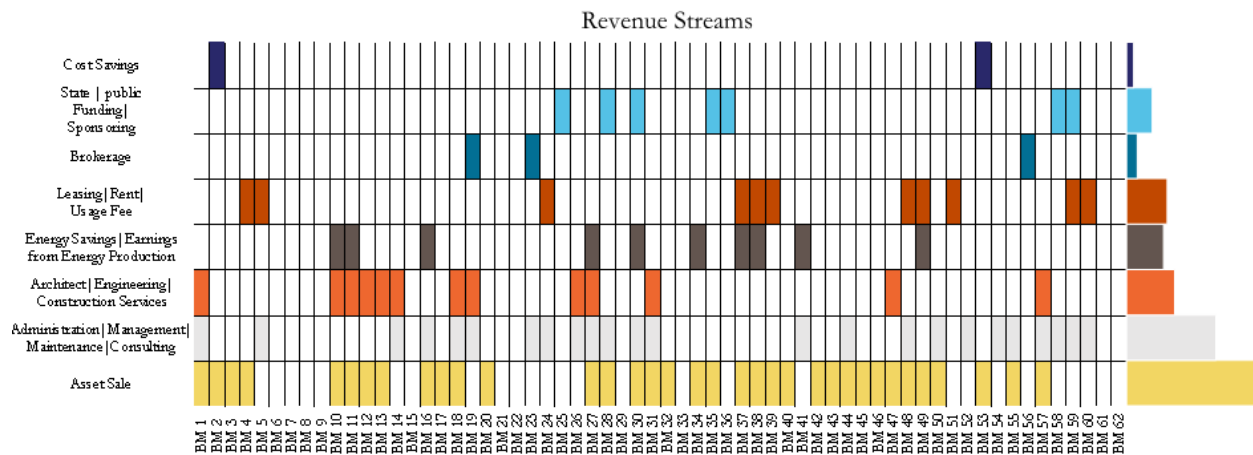


Figure 7: Comparative analysis – Revenues Streams (source: Fraunhofer ISE)

4.6. COSTS

When it comes to the cost structure of business models, the comparative analysis showed that the personnel expenditures play the major role followed by costs for the building and production process, administration/office costs and Consultancy/ Customer Support (see Figure 8). Administration costs thereby incur for almost every company, but are relatively small for construction and engineering companies. Personnel expenditures, on the contrary, are essential for every company. More particular costs such as those for disposal, social projects, research and development are mentioned less frequently and highly depending on the regarding business model.

In order to reduce the overall nZEB costs it is essential to optimize processes in planning and

construction, in which personnel is involved. Furthermore, the optimization of building processes and the cost reduction there is important. It can be achieved by e.g. prefabrication or material switches. During the acquisition and operation phase of a building (Consultancy/ Customer Support), labour-intensive processes and activities are needed and widespread. Those process can be supported by technical innovations (BIM, Social Media, monitoring with automated fault detection...) but the personal contact can't be completely replaced by digital processes. Knowing each other and trust between stakeholders is of major importance for high investments.

4.7. MATURITY STAGES

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 9 shows the different maturity stages of business model innovation.

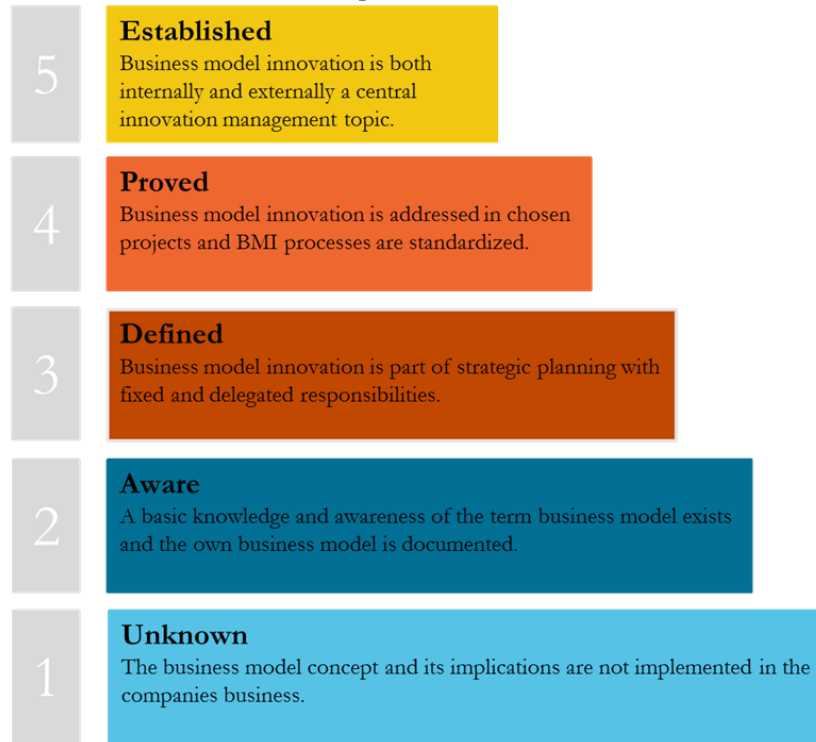


Figure 9: Maturity stages of the implementation of business model concept in companies (following (PROTEMA Unternehmensberatung GmbH))

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. Companies of course have a concept behind their daily business but rarely define it with the given profile parameters. However, most companies have years of experiences in their field and are implementing the nZEB approach for a couple of years now, as an addition to their product/ service portfolio and an investment for future requirements in the building sector.

4.8. STRENGTHS AND KEY FACTORS

In this chapter, the strengths and key factors identified in the analyzed business models are summarized and compared (see Figure 10). Those factors contribute to a business success. Identifying these factors is useful both for the enhancement of existing business models and for the creation of new innovative ones.

Comparing the collected business models (see Figure 10) patterns of common strengths and key factors become apparent. To simplify the analysis the business models have been clustered in the different stakeholder perspectives.

The most recurring **strengths and success factors** have been: **widespread competencies** (with all services being **in-house**) as well as **lock-in**. It describes the ability of the company to **create and maintain good customer relationships**. 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**. **Know-how, innovation and sustainability** as well as **guaranteed prices/performances** also seem to be common strengths and key factors. A little more specific and less frequently mentioned is the capability of **prefabrications** (for faster building process) and the company's **image**.

For General contractors scalability (up/down scaling the resources depending on project size) seems to be of importance, while real estate developers benefit from having influence on the decision level. Vendors, of technical equipment and materials, take the whole life cycle of their products into account; take care of waste reduction and stress transparency as well as a strong customer relationship.

While developers and general contractors seem to cover the full range of services along the building's life cycle, planners often focus their expertise on a certain planning phase. Moreover, innovative planning tools and the capability of using them efficiently are important success factors. This includes know-how in the field and experienced and well trained employees.

Besides these internal challenges many nZEB BMs strongly depend on the collaboration of different partners and stakeholders. This can also be helpful for the creation of new 'business model packages' in which two or more different stakeholders collaborate in order to focus on their own expertise (and reducing costs) but still offering a big range of services along a building's life cycle to retain a strong customer loyalty.

SUCCESS FACTORS

Strengths and Key Factors

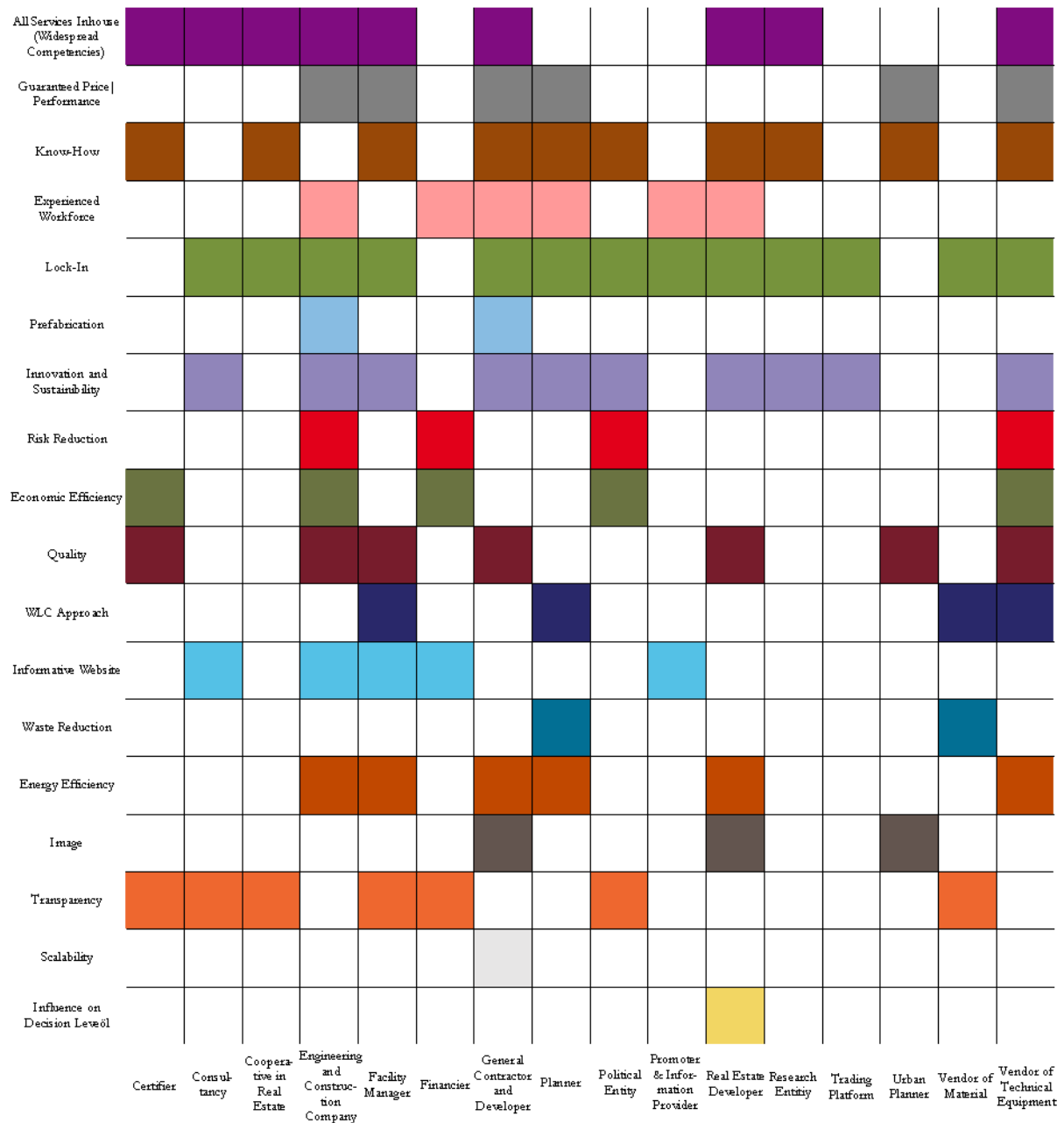


Figure 10: Strengths and Key Factors as factors of success for the Business Models

4.9. LIFE CYCLE PHASES COVERED

In this chapter the different nZEB life cycle phases covered by the collected business models are shown and described with Figure 11. Thereby it becomes apparent, which phase still has plenty of space for new business models.

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. 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 17 business models of project partners as well as additional 39 business models of European markets have been analysed (see appendix). 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. Only one business model has been described that is situated in the political decision or Monitoring phase. Especially the latter can be a supplement to existing models or be done with partnerships (business model packages). The same could apply for business models in the recy-

cling/dismantling and reuse phase where only few have been found so far. Here, plenty of room for new business ideas is given.

Comparing the life cycle cost of a Standard, nZEB and CRAVEzero building (see Figure 11), some substantial differences may be observed. At first sight, a standard building seems to be the cheapest solution; in fact, political decision and planning phase have lower costs, however this leads to higher follow up costs. On the other hand, nZEB buildings show greater efforts in the first planning phase, however it allows to optimize the following phases. In this case, thanks to careful study during the planning and construction phase, it is possible to have some benefits: monitoring, operation, maintenance and renovation phase involves lower costs. In the CRAVEzero building the goal is to give more importance to the planning phase, with extra costs, in which are studied the best solutions to reduce next processes. It will lead to an improvement of the management of the building and the follow up costs in all phases will be lower, such as energy consumption, operation and maintenance costs.

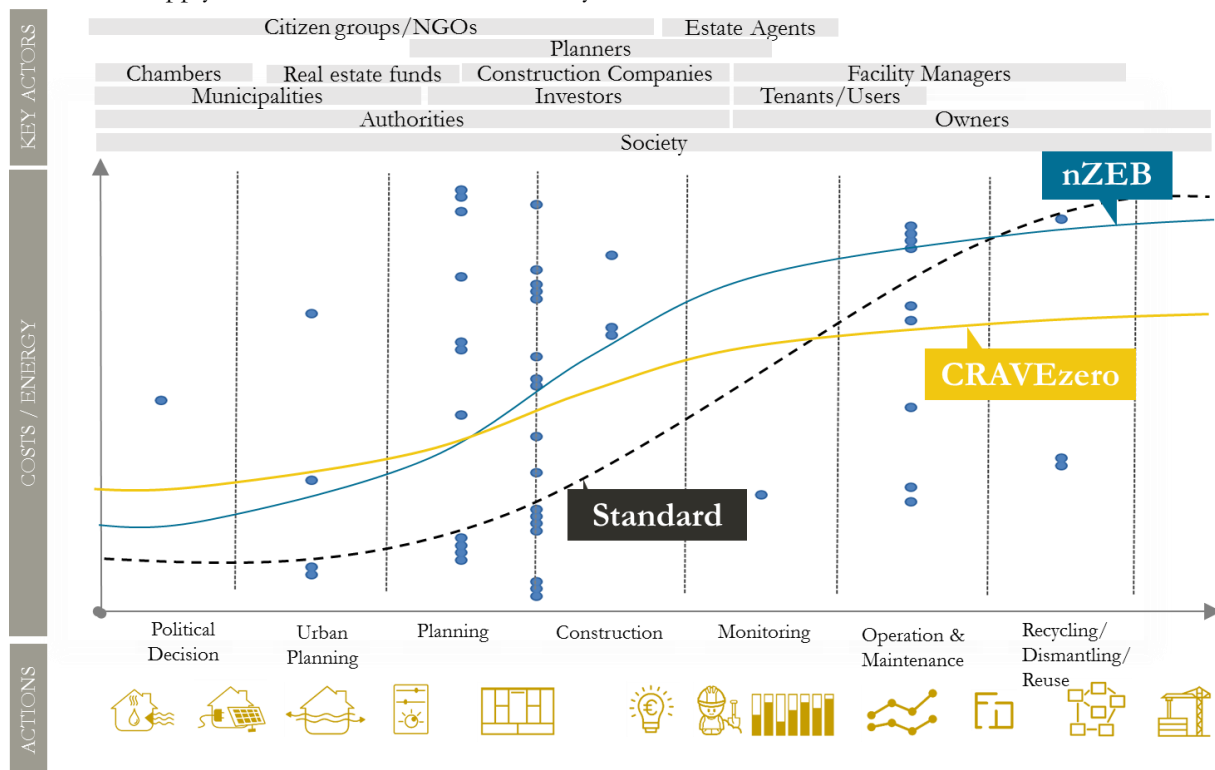


Figure 11: Life cycle phases of nZEBs and Business Model allocation

4.10. LEARNINGS, INSIGHTS, SALIENCES

In this chapter, the results of the comparative analysis are discussed and summarized. Especially noticeable insights, saliences and special learnings will be pointed out.

A comparative analysis, based on the information of the business model profiles, is conducted in order to evaluate whether there are patterns in regard to different stakeholder perspectives that indicate success potential.

The analysis of the value propositions shows that the most common features have been identified to be Green labels, sustainability, energy and cost reductions and efficient energy performance. The usage of renewable energies and sustainable materials is a value that the customer requires to the company in order to increase the efficiency and the value of the building. The customer relationship is a very important point, because it is the beginning to build trust. The main way customers get in touch with the company is the website: here it is possible to see references and past projects, with the description of the problem, solution adopted and benefits obtained. Another point that characterizes a business model of a company is the customer segment, described by location, demographic, financial and functional characteristics. Building owners are the most frequently mentioned segment,

followed by companies, investors and municipalities. Regarding activities and capabilities, the main tasks are design/engineering and development of projects/buildings; less common are services such as dismantling, reuse and renovation, facility management, certifications, prefabrication of building parts and grid services.

Since the aim of a company is to capture value with their offer, the main sources of revenues are related to asset sales and additional services for administration, management and maintenance. Instead, the main costs of a company are represented by personnel expenditures followed by costs for the building and production process and administration/office costs.

The most recurring strengths and key factors identified in the analysed business models are widespread competencies, know-how, innovation and sustainability and guaranteed prices/ performances. It is important to identify these factors, because they can contribute to a business success or limit the success potential. Finally, the analysis of the maturity stages of business model innovation shows that a company with an established stage has Business Model Innovation as a central topic within the general innovation management of the company.

5. LINK TO OTHER WPS

5.1. 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-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.

5.2. 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 best-practice realized projects how they implemented their business. CRAVEzero will offer via the pin board web tool information about creating a business in the nZEB economic and technical 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/>. Further details on how the results of this task can be included in the project pinboard are illustrated below.

6.DISCUSSION

In this report, a number of business models found in the major European markets have been described using a BM profile. This contains some of the most relevant business model building blocks following Osterwalder and Pigneur (2010), such as:

- Value proposition,
- Customer relationship and segment,
- Revenue streams and cost structure

all of which have been described in a qualitative manner by data providers, either companies or through information retrieved in company websites. Part of the analysed business models were provided by the contributing partners of CRAVEzero (BM1-17). The other business models have been described by the partners as well, based on the information found on the respective companies' websites. Some companies have provided their own BMs. However, it is not guaranteed that the information have been understood and filled into the profiles correctly and holistically.

Collected profiles are showing business models belonging to all life cycle phases of nZEBs. The comparative analysis shed light on the different mentioned parameters and how they vary depending on the stakeholder perspective. 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. Other models are in a developing phase where cost and revenue structures are under development. Depending on the maturity of the business model, adaptations can be established

to improve the models. Moreover, the analysis shows similarities/patterns and differences/ gaps which can be used for new business ideas.

In analysing the business models, common strengths and key factors have been identified. Differences in regard to geographic clusters could not be found. The structure of BMs is found to be rather depending on the stakeholder perspectives and activities and not on the geographic location.

The results of this report can be used to enhance existing and develop new business models related to nZEBs, and fruitful input for the project Pinboard can be produced. The focus in future tasks will be on creating business models that mix a set of stakeholders with the aim of decreasing costs and risks along the NZEB value chain, without compromising on building quality.

Cost reduction is perceived as the main advantage in value proposition of analysed BMs. However, most of the BMs present a relevant cost structure for running the day-to-day activities, with a focus on personnel costs. Such costs are mostly ascribed to workmanship related to technical tasks, while administrative costs seem to be less relevant. In this frame, it is noticeable how the adoption of systemic approaches in the design and construction phases (e.g. prefabrication of building components, design for assembly, and so on) could improve such cost structure in favour of personnel cost reduction. Sustainability is also a prominent parameter in value proposition.

In terms of specific services offered to clients, dismantling, reuse and renovation, facility management, certifications, prefabrication of building parts and grid services are not very widespread. Indeed, they could represent a valuable boost in competitiveness for players that become able to offer a set of integrated services, covering the whole value chain and optimizing resource use all along. These additional services could be proposed on the project pinboard to customize pre-defined business models and evaluate extra opportunities that open up on the market when offering integrated services, which is very much in the direction of a “smart” and “flexible” approach to building design and construction.

Most of the business models collected in this task are connected to the building development phase, cutting out the end-of-life of the building. However, some relevant providers, such as real-estate developers and building products vendors are already focusing their field of activity on building recycling. As the consortium gathered BMs along the whole NZEB value chain, it is noticeable to point out that even those stakeholders acting at a higher level, during the policy making or planning phase, are often discarding the end-of-life planning in their value proposition. As a takeaway of this considera-

tion, it can be said that including this latter phase in the value proposition to the final client could boost business opportunities, reducing hidden costs related to building dismantling and recycling. In fact, it is proven that analysing the whole-life cycle of the building can produce added value, so an accent should be put in integrating the life-cycle costing of the building in all planning, design and construction stakeholder companies.

Larger companies seem to cover more phases along the value-chain, as well as certification bodies. On the contrary, specialized service providers are more focused on a part of the construction process. In addition, the BM analysis has shown that most companies acting in the field do not consider having a mature BM as a priority for their activity; this can be linked to the diffused craftsmanship approach to construction adopted by a number of small and medium size companies. On the other hand, the information collected through this analysis can be used as a valuable input to the project pinboard, proposing contamination of business models from a set of similar stakeholders to provide clients with an extended range of services, which is currently a missing feature for the analysed models.

TERMINOLOGY

6.1. 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
EPG	Energy Performance Guarantee
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

6.2. 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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<https://www.protema.de/blog/business-model-innovation-fitness-messen-und-verbessern/>.
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7.APPENDIX

BM 1: GENERAL CONTRACTOR AND REAL ESTATE DEVELOPER: HOUSING ASSOCIATION

Website: <https://www.koehler-und-meinzer.de>

VALUE PROPOSITION:

As a traditional and regionally established company, it forms a broad portfolio as a real estate developer and general contractor. The customer receives a turnkey, energy efficient, ecological and individualized property. Both owners and investors benefit from the expertise of various specialist consultants and quality assurance measures during the whole planning, building and operational process. The energy standard of the building meets the current guidelines and funding possibilities in Germany. Different offers from architecture services, building renovation, municipal and commercial buildings up to the maintenance/ administration and real estate services are available.

CUSTOMER RELATIONSHIPS:

As an established brand, the company benefits from its regional presence and public perception. In addition to common advertising strategies and mouth-to-mouth propaganda, the focus lies on professional relationship, personal support and attendance. The company therefore provides an internet presence which is linked to the current projects and sales offers. A lot of references of previous projects as well as the guarantees and awards are shown on the website. Contact via telephone or personal contact is available.

CUSTOMER SEGMENT:

The offer is widely spread: from owners and investors of single and multi-family houses/apartments to customers of industry or municipality buildings. In the real estate agency service other customer segments (seller, buyer and tenant of objects) are addressed.

ACTIVITIES AND CAPABILITIES:

The portfolio includes a widely diversified spectrum of services around the topic of planning,

construction and maintenance of buildings. The aim is to exceed current energy standards and find innovative, cost-effective solutions for owners that optimize the operating costs. Additionally, the company benefits from long-term relationships with several specialists and consultants and established regional craft businesses.

REVENUES:

Revenues are made by selling apartments or turnkey houses. Additional income will be provided through a wide range of services around the topics of planning, building, building management and brokerage.

COSTS:

The main costs (next to administrative costs of the company itself) in the field of real estate developer and general contractor are the construction costs of the individual trades, the production costs and the remuneration of engineers

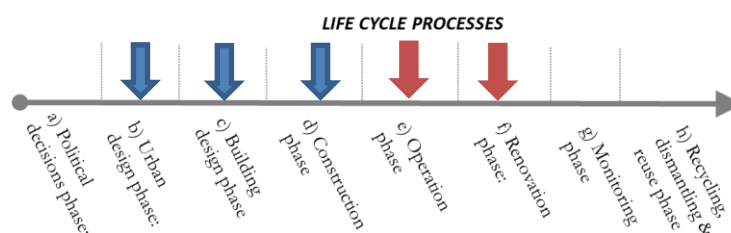
STRENGTHS AND KEY FACTORS:

- ✚ Reliable regional partner with a good reputation
- ✚ individual customer service
- ✚ flexible contract design
- ✚ individual, high quality and sustainable solutions for the customers needs
- ✚ long-term relationship with suppliers, skilled craftsmen, professional engineers

MATURITY:

The company has a long planning and construction experience. In the last decades, many reference projects and buildings have been created. Through a continuous adjustment and improvement process, the buildings are adapted to the respective (also energetic) state of the art and the growing demands of the customers.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 2: CONSTRUCTION COMPANY - VÄLA GÅRD

Website: <https://www.skanska.se/vart-erbjudande/vara-projekt/57810/Vala-Gard>

VALUE PROPOSITION:

The value proposition consists of three parts: more efficient use of office space, the no1 green construction company, and a showcase for clients and other stakeholders.

The construction and developing company Skanska was situated in many different locations in Helsingborg. By relocating everyone to the same office, it was possible to offer a modern and energy efficient office space with no increased rental costs.

Skanska wants to be perceived as the leading company in the world within green building. In 2009, our new business goals for green were released and Väla Gård wanted to be the first project to manage the toughest level Deep Green (a Skanska term for net Zero Energy buildings with high environmental standards) - a state of art green office. With a plus energy performance, highest LEED-points in Europe, attention from media and many awards and prizes received, Väla Gård exceeded the expectation.

Customers who want to order environmentally responsible buildings and infrastructure should feel that the natural choice is Skanska.

Skanska built the office for itself, thus being developer, tenant and constructor. This enabled simple and fast communication. Furthermore, the team strived towards a common goal, thus reducing sub optimizing.

CUSTOMER SEGMENT:

Clients with interest in offices like Väla Gård have an LCC-perspective on investments and deep green ambitions, e.g. industry or real estate clients.

ACTIVITIES AND CAPABILITIES:

An extensive pre-study was carried out to gather alternative rental costs elsewhere compared to predicted costs for the new office, and a concept analysis in order to define important design parameters. The design process was iterative with focus on dialog and cooperation.

REVENUES:

Value is generated through the thousands of projects executed by Skanska each year. The construction business stream does not tie up capital but instead operates with free working capital. This capital combined with the profits enables the financing of investments in project development, which generally generate an excellent return on invested capital. This is illustrated in Figure 2.

COSTS:

Important costs were superstructure, heating- and cooling system and PV's. Being both a constructor and developer, Skanska is able to design projects in a cost-efficient way. Additional costs, compared to a standard project, are 6-8 %, with a favorable life cycle cost due to very low operational costs.

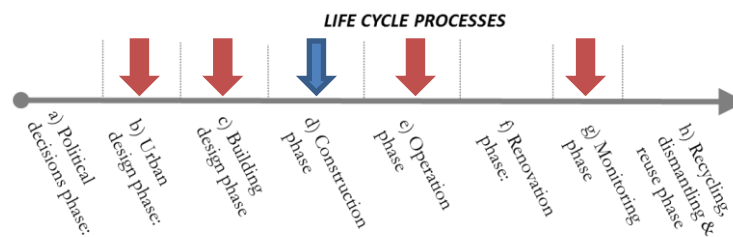
STRENGTHS AND KEY FACTORS:

- ✚ Early involvement of energy engineer designing design principles and parameters
- ✚ Internal costumer, enabling fast/simple and straightforward communication.
- ✚ Setting a clear target and holding on to it (NetZEB)
- ✚ Costruction team; outperforming in every step.

MATURITY:

The company has had its green vision since 2009 and has since gathered expertise and experience.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 3: CONSTRUCTION COMPANY – SOLALLÉN

Website: <https://www.skanska.se/vart-erbjudande/vara-projekt/57940/Solallen%2C-Vaxjo>

VALUE PROPOSITION:

The houses in Solallén are NetZEB, i.e. they generate slightly more renewable energy than the total demand. They are certified according to the Swedish green label “Svanen”, i.e. the houses have minimal energy costs and are built with durable, low emitting materials with low GHG-impact. End customer will get a healthy home, very low operational costs, innovative “free” cooling from the ground source bore holes distributed by the ventilation, and a green future-friendly quarter.

Skanska is involved in the first two years in the user stage measuring and optimizing the energy use for the building. Quarterly meetings are conducted with representatives from the owners to ensure that the client expectations are met.

CUSTOMER RELATIONSHIPS:

Ongoing residential projects are displayed on the Skanska website where people sign up to state their interest. A selling brochure explaining the extraordinary green features of Solallén was handed out. All interested people were invited to a meeting where they got more information and a personal contact. The personal contact is maintained through the process of the customer choose to buy a dwelling.

CUSTOMER SEGMENT:

The offer is directed to small/young families and couples, preferably with a green interest. The houses are designed as one-storey buildings with small plots, appealing to families with small children.

ACTIVITIES AND CAPABILITIES:

An extensive pre-study was carried out in order to define important design parameters, which helped

the project to reach its goals. The green ambition was communicated to the municipality to not only get a building permission but also a reduced price for the land – this was a general offer from the city, an incentive for energy efficient building. Furthermore, external funding was received for follow-up costs.

REVENUES:

Value is generated through the thousands of projects executed by Skanska each year. The construction business stream does not tie up capital but instead operates with free working capital. This capital combined with the profits enables the financing of investments in project development, which generally generate an excellent return on invested capital.

COSTS:

The most important costs were superstructure. The total extra costs for Deep Green performance was 10 %. Being a construction company and a developer Skanska is able to design projects with high performance in a cost efficient way.

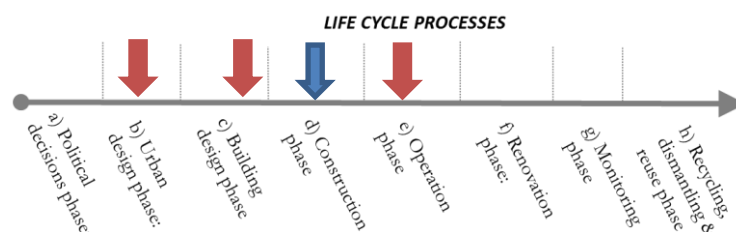
STRENGTHS AND KEY FACTORS:

- ✚ Early involvement of energy engineer who defined design principles and design parameters
- ✚ Setting and holding on to a clear target (Net-ZEB)

MATURITY:

The company has a long history in Sweden > 100 years, so customers trust Skanska to deliver on its promises. The high green ambitions and expertise are well-known in Sweden since a few years back.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 4: URBAN PLANNING -BOUYGUES CONSTRUCTION

Website: www.bouygues-construction.com

VALUE PROPOSITION:

The value proposed is to guarantee a balanced district ecosystem in social, economic and environmental manners. In addition, BYCN guarantee the district performance by a third party via obtaining environmental labels. And finally, BYCN restores the attractiveness of the areas on which the eco-district is located.

CUSTOMER RELATIONSHIPS:

BYCN will develop customer relationships by responding to calls for tenders and by involving the users in the decision making processes such as co-creation and co-development.

CUSTOMER SEGMENT:

The customer segment will be dedicated to property developer, public institutions such as schools, hospital and investors.

ACTIVITIES AND CAPABILITIES:

We are a global player in construction and services. Thanks to our know-how and our expertise, we are a leader in sustainable construction. Operating in more than eighty countries, with 47,350 employees, we have a long-term commitment to our customers thanks to our primary source of added value, shared innovation.

Bouygues Construction operates in the sectors of building, infrastructure and industry, seeking to be a global player positioned at every stage of the construction value chain; also acknowledged as a

key player in sustainable construction. It is responsible for numerous eco-neighborhoods, low-carbon buildings (timber construction), structures that meet the world's most stringent eco-standards and positive-energy renovations of sites.

The success of our strategies depends on our capacity to differentiate ourselves and to innovate in all areas, for the benefit of our customers as much as of our employees. Such innovation has to result from close collaboration between external and internal partners.

REVENUES:

The only source of revenues for the urban planning will be the sale of the area and the district project. The type is an asset sale with transaction revenues. The pricing mechanism will depend on the feature of the product.

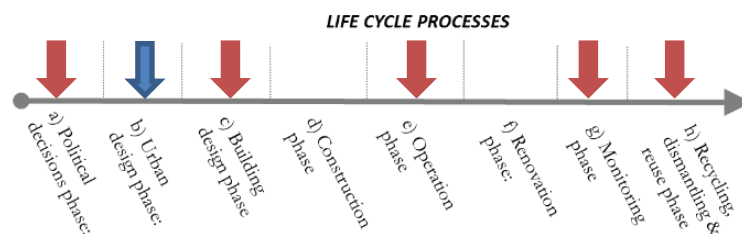
COSTS:

The main costs for Bouygues are the supply of raw materials, purchase of the land, development services, the creation of roads and sharing energy production systems; all of which are variable costs. Everything is a variable cost. Economies of scale could be done on all the previous expenditures.

STRENGTHS AND KEY FACTORS:

- ✚ Guarantee of neighborhood performance
- ✚ Upgrade of life quality
- ✚ Focus on value
- ✚ Know-how in urban planning

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 5: COOPERATIVE HOUSING - DIE WOGEN

Website: <https://diewogen.at/wie-funktioniert-ein-wogen-projekt/>

VALUE PROPOSITION:

The idea behind WoGen is the implementation of community living by offering know-how, support in participation processes, legal framework, experiences from other projects, credit-worthiness for financing, affordable and sustainable living and mobility solutions – all in one cooperative housing model. The inhabitants of a house usually form an association that rents the house from WoGen and in turn rents the individual apartments to its members. As a cooperative member of WoGen you combine three roles in one person – and so commit yourself strongly to the cooperative:

1. As a member of the cooperative you are co-owner in all WoGen real estates (some real estates are also open for company use);
2. As a member of the operator association you are your own landlord;
3. As a resident, you are a tenant.

CUSTOMER RELATIONSHIPS:

Members of the association and representatives of the cooperative themselves live and network these projects and contacts. In order to get in touch with customers the community projects are actively advertised. WoGen provides sociocratic-organized gatherings and events.

CUSTOMER SEGMENT:

The offer is directed at residents who are interested in a community living model, at private and commercial customers interested in collaborative building projects and in future maybe at communities/municipalities which are interested in developing cross-generational living projects.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes workshops and gatherings to establish core-groups for the imple-

mentation of the community living projects. Financial and legal negotiations as well as the professional search for planning and construction teams are organized. WoGen develops, builds and operates a variety of social, sustainable and inclusive housing projects, in which people of all generations live and work.

REVENUES:

The WoGen members/tenants are willing to pay for the building project development, the solvency, the know-how for implementation, different usage and subscription fees / rent, basics to establish and run the cooperative.

COSTS:

The costs are clearly value-driven with a variable cost-structure depending on each single project. They are composed of bank loans, construction, planning and capital costs as well as service charges from the operation of the community living. There are only few fixed costs for the office administration, but on a very minimum level when no project is actually in development.

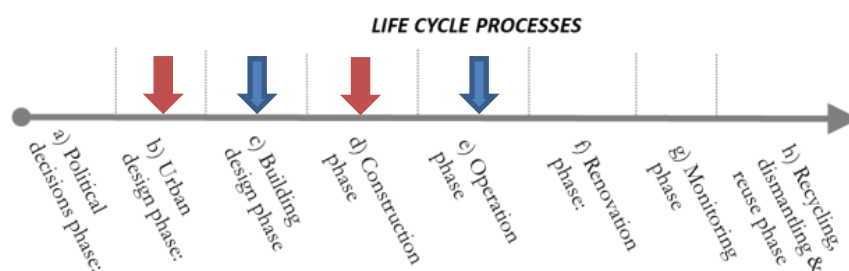
STRENGTHS AND KEY FACTORS:

- ✚ Professional help for cooperative housing
- ✚ Special legal and financial support
- ✚ Strong involvement of all tenants respectively members of the cooperative
- ✚ Life-long customer support for liaison

MATURITY:

The WoGen is Austria's first and only property developer who exclusively implements cooperative housing projects with and for people who want to live in community.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 6: PARTICIPATION IN COMPETITIONS

Pending

BM 7: LCC + CO2 OPTIMIZATION IN EARLY DESIGN STAGE

Pending

BM 8: PASSIVE HOUSE CERTIFICATION / PHPP

Pending

BM 9: DAYLIGHT OPTIMIZATION

Pending

BM 10: DESIGN AND BUILD RESIDENTIAL SECTOR

Website: www.bouygues-construction.com

VALUE PROPOSITION:

The value proposed for social housing and private renters will be to lower the risks of not paying fuel costs by end users, to ease the maintenance and operation, to enhance quality, durability and comfort. In addition, nZEB building has less risk of obsolescence from a thermal regulation point of view where we can propose energy performance engagements and warranties. Rent charges will remain stable for the end users for a period of 20-30 years. On the other hand, private investors will have the possibility to sell nZEB houses at a higher price since we are known for the quality of our works and achievements. We can propose energy performance engagements and warranties for the whole building for a period of 20-30 years. As a final point, Bouygues can propose and advice environmental certifications or labels where the quality of the building will be certified by a third party.

CUSTOMER RELATIONSHIPS:

Private sectors will have simple and clear communications with their clients. They build a trustful and reliable relation with customers by showing them our skills and our past in nZEB references. They will target the largest and top investors to explain them the benefits of a nZEB building. On the other hand, public investors will comply their applications with the public market code. Since, they have to launch calls for tenders and compare at least three offers, marketing will less necessary in the most cases.

CUSTOMER SEGMENT:

The customer segment will be dedicated to social housing companies such as semi-public bodies. In addition, private investors will be a beneficial customer by investing and selling directly after construction.

As a final customer, private renters will invest and then rent the building.

ACTIVITIES AND CAPABILITIES:

Thanks to our know-how and our expertise, we are a leader in sustainable construction operating in more than eighty countries, with 47,350 employees. We have a long-term commitment to our customers thanks to shared innovation. The success of our strategies depends on our capacity to differentiate ourselves and to innovate in all areas, for the benefit of our customers as much as of our employees. Such innovation has to result from close collaboration between external and internal partners.

REVENUES:

Revenues of the company will be by selling the building (asset sale both product and feature dependent). On the other hand, energy savings for EPG contracts will create value and revenues. The value of revenue will depend on the monthly energy consumption of the building.

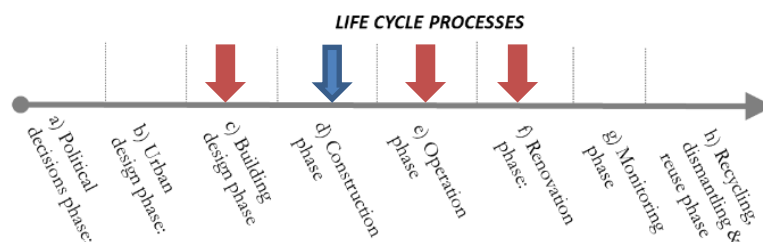
COSTS:

The main costs are the supply of raw materials for construction and production, labor for installation, studies/consultancies and certification costs all of which are variable costs except certifications which have fixed annual cost. Economies of scale could be done on raw materials and labor costs.

STRENGTHS AND KEY FACTORS:

- ✚ Guarantee of building performance and operation cost
- ✚ Widespread competencies
- ✚ Learning and up/ down-scaling from previous projects.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 11: DESIGN AND BUILD TERTIARY SECTOR

Website: www.bouygues-construction.com

VALUE PROPOSITION:

The value proposed for tertiary sectors is to ease the maintenance and operation, to enhance quality, durability and comfort. In addition, nZEB building has less risk of obsolescence from a thermal regulation point of view where we can propose energy performance engagements and warranties. Rent charges will remain stable for the end users for a period of 20-30 years. Bouygues can propose and advice environmental certifications or labels where the quality of the building will be certified by a third party. Finally, we can propose energy performance engagements and warranties for the whole building for a period of 20-30 years.

CUSTOMER RELATIONSHIPS:

Customers will have simple and clear communications with their clients. We build a trustful and reliable relation with customers by showing them our skills and our past in nZEB references. We will target the largest and top investors to explain them the benefits of an nZEB building.

CUSTOMER SEGMENT:

The customer segment will be dedicated to private investors that will sell or rent the building to their clients immediately after the construction phase or in a period less than 5 years. In addition, these private investors may occupy the buildings like company's headquarters.

ACTIVITIES AND CAPABILITIES:

Thanks to our know-how and our expertise, we are a leader in sustainable construction operating in more than eighty countries, with 47,350 employees. We have a long-term commitment to our customers thanks to shared innovation. The success

of our strategies depends on our capacity to differentiate ourselves and to innovate in all areas, for the benefit of our customers as much as of our employees. Such innovation has to result from close collaboration between external and internal partners.

REVENUES:

Revenues of the company will be by selling the building (for design and build contracts). The revenue stream will be an asset sale with a pricing mechanism related to features and products. The value of revenues will depend on the type of the building.

On the other hand, energy savings for EPG contracts will create value and revenues. The value of revenue will depend on the monthly energy consumption of the building.

And finally, leasing of the building (for PPP contracts) will be a source of revenues by lending or renting spaces. The pricing mechanism will depend on the product features and contract duration.

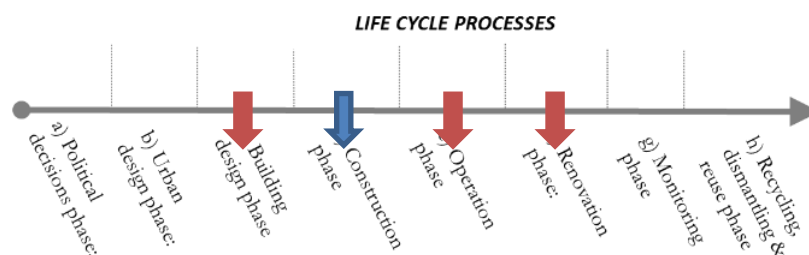
ACTIVITIES AND CAPABILITIES:

The main costs for Bouygues are the supply of raw materials for construction and production, labor for installation, studies/consultancies and certification costs; all of which are variable costs except certifications which have fixed annual cost. Economies of scale could be done on raw materials and labor costs.

STRENGTHS AND KEY FACTORS:

- ✚ Guarantee of cost and performance;
- ✚ Knowledge of process and detailed cost data

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 12: CONSTRUCTION COMPANY - MORETTI MULTIPLAN

Website: <https://morettispa.it>

VALUE PROPOSITION:

The company offers architectural & engineering competencies, prefabricated solutions, purchasing contracts and on site operation management. It provides cost and time control and flexibility for custom solutions or variances.

CUSTOMER RELATIONSHIPS:

The company offers personal relations based on technical design, cost competencies and good family owner reputation. The company relies upon the partnership of architectural & engineering firms and has direct relationships with final customer companies.

CUSTOMER SEGMENT:

The offer is directed at Real Estate companies or developers and small, medium and large private companies.

ACTIVITIES AND CAPABILITIES:

The key activities of the company consist in estimating precisely the costs and in providing engineering solutions. Other activities include purchasing contracts, project management and business relationships.

REVENUES:

Revenues come from engineering & construction, even if each single big work is like a single stream. Price derives from detailed costs "plus" a mark-up for the contracting and works management.

COSTS:

Main costs are referred to direct costs for the work. The company uses extensively external work, so the most of costs are variable. Fixed costs are related to indirect structures for commercial activities, project management & control and purchasing process.

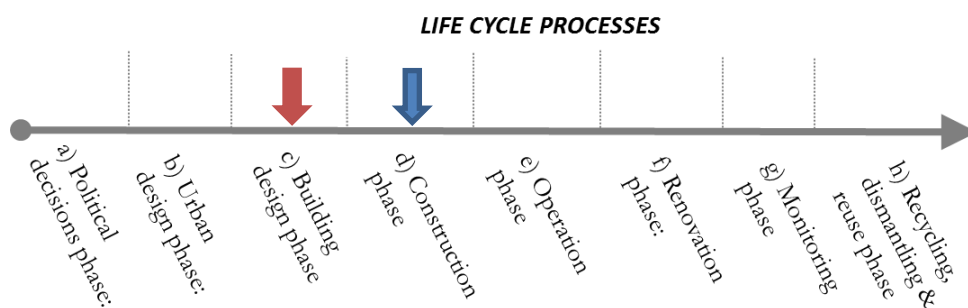
STRENGTHS AND KEY FACTORS:

- ✚ Project manager
- ✚ Cost estimator
- ✚ Buyer & contract manager

MATURITY:

The company has a long construction history and a long track of experience in high quality prefabricated solutions.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 13: CONSTRUCTION COMPANY - MORETTI MORE

Website: <https://morettispa.it>

VALUE PROPOSITION:

The company offers Architectural Design of the houses model and high quality in any details, together with the opportunity of a high customization with the qualified support of an architect. The offer includes total contract service managing the whole process from design to delivery and fixed and guaranteed time and costs. The company uses innovative technologies (2 patents) and provides the possibility of integration of concrete and wood.

CUSTOMER RELATIONSHIPS:

The company guarantees a deep direct relationship with experts based on service and competencies in order to make the customer satisfied. In this way last customers will become the main promoters of the company. It exploits direct approaches for the final customers using mkt and communication channels and it relies upon the publicity of external architects and other professionals.

CUSTOMER SEGMENT:

The offer is directed at families wishing to build their own home as well as high spending customers, 40-65 years old, professionals, entrepreneurs and corporate executives. Ideal customers like architectural quality and modern design, want total contract service because they do not have time and / or do not want to deal with the numerous suppliers and appreciate the role of the architect to support the custom design and his/her own decision-making process.

ACTIVITIES AND CAPABILITIES:

The key activities of the company include sales process and customized process, product delivery and product development.

REVENUES:

Revenues come from architectural design & engineering & construction for "customized the product" (home model). Price derives from detailed costs "plus" a mark-up for design, contracting, works management and, in the future, for the brand quality.

COSTS:

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

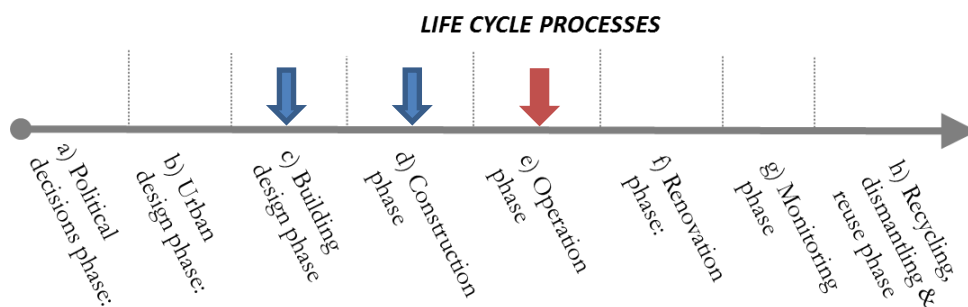
STRENGTHS AND KEY FACTORS:

- ✚ Mkt & sales manager
- ✚ Customizer owner
- ✚ Project / client manager
- ✚ Product developer

MATURITY:

The company has a long construction history; indeed, it has been building for 50 years, so it can guarantee experience and solidity.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 14: FACILITY MANAGEMENT

Website: www.bouygues-construction.com

VALUE PROPOSITION:

Bouygues Energies & Services is a global player in energy, digital and industrial transition all over the world. It designs, builds, maintains and operates projects in the sectors of buildings, infrastructure, and industry. The value proposed is the strong know-how in energy performance and energy management. In addition, energy (produced from RES...) and comfort performances can be guaranteed to clients due to the EPG for example. Also, we can help the client with the administrative steps to benefit from government financial incentives, when they have to renew their equipment. BYES offers a regular audits of the state and performances of the building equipment in order to optimize their functioning. In order to choose the best value of money, BYES offer the possibility of renegotiation of the supply contract with clients. BYES uses BIM to monitor all interventions and changes in the performance of the building.

CUSTOMER RELATIONSHIPS:

BYES develops an everyday client relationship. The facility managers from BYES become part of the client's team in order to meet its needs and constraints.

CUSTOMER SEGMENT:

The customer segment will be mainly private tertiary companies (such backs, offices...) and industries; more precisely, owners of the building or sometimes managers. Less frequent, public tertiary (such hospitals, schools, prisons...) within Public-Private Partnership contracts only can be a targeted segment.

ACTIVITIES AND CAPABILITIES:

We are living in an increasingly interconnected world, and the way in which we use energy is changing. We put the expertise of our 12,500 employees and the combined strength of a major group to work for you, providing long-term support. Bouygues Energies & Services operates in the sectors of telecom, building, infrastructure and industry and energy. As a player in the energy, digital and industrial transition, we deliver tailor-made solutions and services for your infrastructure, buildings and processes.

REVENUES:

Revenues of the company will be by signing maintenance contracts in order to subscribe to maintenance services over a certain period. On the other hand, replacement of defective equipment will be a source of revenues only if the related costs are higher than the maximum amount included in the maintenance contract. The pricing mechanism will depend on the feature of every product.

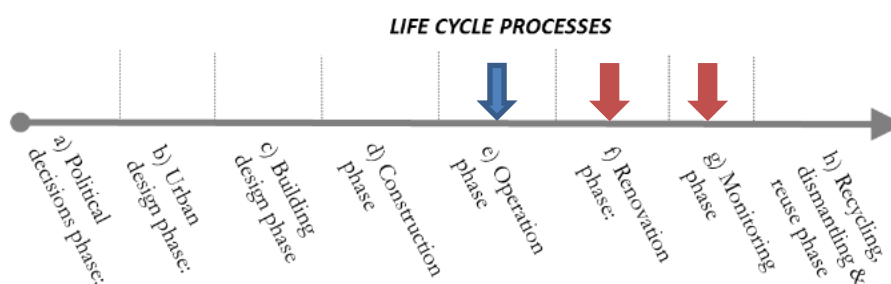
COSTS:

The main costs for BYES are supply of raw materials, subcontracting (around 35k€/10000m²), supply and installation of spare parts and new equipment and BYES manpower such as energy managers... (~ 35k€/10000m²); all of which are variable costs. Economies of scale could be done on the supply of raw materials, spare parts and new equipment. Economies of scope will be applied on the other types of costs.

STRENGTHS AND KEY FACTORS:

- ✚ knowledge and automated controls
- ✚ Maintenance organization

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 15: MONITORING

Pending

BM 16: PV-CONTRACTING: HELIOS

Source: <https://www.helios-sonnenstrom.at/photovoltaik>

VALUE PROPOSITION:

The contractor plans, implements and operates PV-systems. For this purpose, the company uses suitable public and private roof areas, which are provided for 13 years. During this time, HELIOS manages the solar energy production, trade and selling of the produced power, and takes care for the maintenance of the roof area. At the end of the 13th year, HELIOS hands over a well-maintained photovoltaic system to the owner of the property. In order to finance these and other PV-systems, the company offers “sun bonds” with the value of EURO 500,- as a kind of civic participation process: Customers can buy them and will be refunded within 13 years with 2,2% of annual interest. So the company invests in local and green energy supply with reduced risks of construction and maintenance for the building owner.

CUSTOMER RELATIONSHIPS:

Members of the company themselves live and network these projects and force face-to-face contacts. In order to get in touch with customers the “sun bonds” and contracting model are actively advertised. On site visibility of installations is important.

CUSTOMER SEGMENT:

The offer is directed at energy utilities and their customers who pay for the “green” power, and at building owners like municipalities, industry, private and commercial offering roof area.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes the update of technical, legal and financial know-how to plan, implement and maintain PV-systems. This includes also sale and marketing, set up of contracts, accounting and controlling. The companies’ activities establish strong relationships to the customers.

REVENUES:

Revenues come from the sold power (usually by contract with energy supplier and Austrian eco-power funding coordination), incentives (on investment or on sold power – mostly fixed prices). Customers pay for services like “sun bonds” or a full range service of PV-system implementation.

COSTS:

The costs are composed of installation and purchase of PV-modules, pay-back of investment to the “sun bond”-holders, maintenance of components like roof, establishment of contracts and legal advice, handling of insurance and subsidies, training on technology.

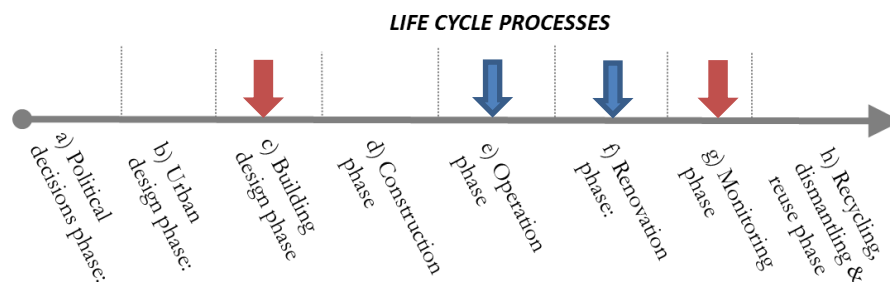
STRENGTHS AND KEY FACTORS:

- ✚ All in one solution for green power production
- ✚ Easy future ownership of PV-systems for building owners
- ✚ Life-long customer support if needed

MATURITY:

The contractor is all in one supplier of photovoltaic solutions, producing electricity from sunlight in an affordable and “on every roof” mountable way.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 17: REAL ESTATE DEVELOPER- BOUYGUES CONSTRUCTION

Website: www.bouygues-construction.com

VALUE PROPOSITION:

The company offers a reduction of cost due to the installation of renewable energy in order to produce free energy from sun, wind, geothermal... In addition, to the enhancements done during the design and construction phases in facades, HVAC systems... in order to lower energy consumption and respect the future thermal regulations. As a result of these two services, user will resale the extra produced energy to the grid provider. Also, the neighborhood performance will be guaranteed by a third party via obtaining environmental labels. With time, the quality of life of users will be improved and maintained.

CUSTOMER RELATIONSHIPS:

The company developed a business to customer strategy, since the community will be maintained to collect opinions and suggestions proposed by the users. In addition, providing support to exploit and maintain the district will be very important at least at the beginning.

CUSTOMER SEGMENT:

The offer is dedicated for two types of customers: Private investors such as individuals or companies and public investors such as social housing.

ACTIVITIES AND CAPABILITIES:

Real estate development is a multi-step process that can be risky, lengthy and complicated. It can take years to bring a project from the initial planning stage through construction to final completion stage. Real estate development projects provide the scope of delivering a product that does not currently exist in a market, often providing the

fresh new supply to please pent-up market demand.

A real estate development project can be divided into three stages:

- Early stage (pre-development): It focuses on due diligence, research and permits. It can vary in duration.
- Middle stage (Construction): It involves construction works and risks at this stage are reduced but certainly not eliminated.
- Final stage (Operation): The final stage of the development process, operation, is the first stage of the building's life. While the pre-development and construction risks may be removed by this point, obtaining tenants is still at risk.

REVENUES:

Revenues of the company will be made by selling lots such as buildings, apartment

COSTS:

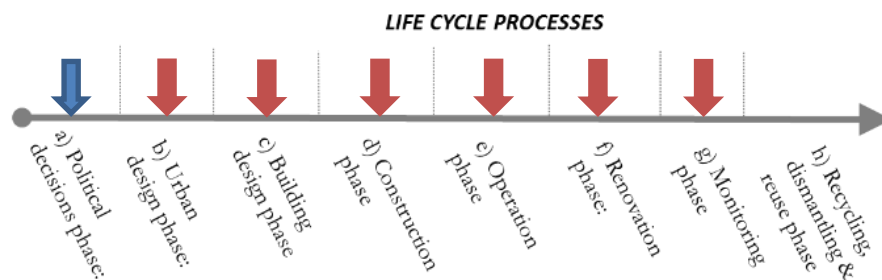
The main costs for a real estate developer are as follow:

- Raw material for production
- Purchase of land
- Construction costs
- Sub-contractors (community life animator...)

STRENGTHS AND KEY FACTORS:

- ✚ Influence on decision level
- ✚ Touching all building relevant sectors
- ✚ Communication and organization of many stakeholders

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 18: CONSTRUCTION COMPANY-PREFABRICATED HOUSES

Website: <https://www.schwoererhaus.com/en-gb/>

VALUE PROPOSITION:

The company offers prefabricated houses with very high energetic standards such as efficiency houses (40+, 40, 55), Plus-energy houses and passive houses such as single or multiply family homes, bungalows and double houses. The offer includes a carefree support starting with informing and advising customers to the actual building and (optionally) renovating processes of a building. With a high level of customization as well as cost and planning security the customer's wishes are met. Moreover, the company promises stable building value and a secure, healthy and sustainable building process, fair cost effectiveness and a transparent communication of costs.

CUSTOMER RELATIONSHIPS:

In order to get in touch with customers the company provides "Building information days", brochures and a detailed website. References of previous projects as well as guarantees of prices and various certificates and awards shown on the website are used to build trust. Personal assistance, a customer service reachable via telephone hotline as well as internet and the offer of renovation services helps building a long-term customer relationship.

CUSTOMER SEGMENT:

The offer is directed at families wishing to build their own home as well as private and public investors building single and multiply family houses all of which emphasize on sustainable and energy efficient buildings.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes providing the necessary information for customers, consultancy, intermediation of architects, construction and its

supervision as well as optional financing services, renovation and customer support. Additionally, the company benefits from having their own production sites for building parts, parks with show houses, kitchen studios, design joineries and finance services spread across Germany.

REVENUES:

Revenues are made depending on the relevant contract. The company offers various different contracts depending on the construction stages included. Furthermore, costs depend on the customers' wishes such as type of building, architectural style, technical equipment etc. Moreover, additional revenue streams for financial consultancy, interior furnishing or renovating tasks are possible.

COSTS:

The company produces their building materials and prefab parts itself which is likely to be the most expensive expenditure (resources) followed by personnel expenditures for the construction phase, consultancy and customer support.

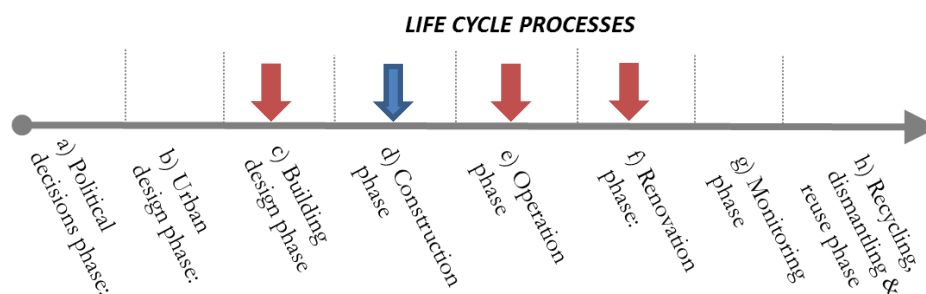
STRENGTHS AND KEY FACTORS:

- ✚ Prefab buildings for faster construction
- ✚ Easy coordination (most services inhouse)
- ✚ Own manufacturing facilities, finance service, kitchen center and show house parks
- ✚ Life-long customer support for lock-in

MATURITY:

The company has a long construction history and can provide clients with technical data from older buildings. These data can be used for e.g. future energy efficiency upgrades and design changes.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 19: DECONSTRUCTION/CONSULTING/REUSE

Website: <https://rotordc.com/workshops/>

VALUE PROPOSITION:

The company offers services in the field of salvaged building components. It dismantles and sells materials and provides assistance to building owners, contractors and architects on the subject. The main service is physical removal of reusable materials from demolition and renovation site and sale of these materials. Moreover, the company accepts materials in consignment: after an assessment of the value, the item is put on sale on the website. Finally, it offers a consultancy and design assistance prior to demolition and on potential for site reuse.

CUSTOMER RELATIONSHIPS:

In order to get in touch with customers the company organizes workshops and events in its shop's atelier or conference room and provides brochures and a detailed website. There is an online shop where the customer can directly buy products. In the news' section case histories are shown with typical interventions and a focus on products. For consultancy and sales the customer can get in touch with the company going directly to the warehouse, by email or by phone.

CUSTOMER SEGMENT:

Services are offered to large building owners and demolition companies wishing to reuse materials from demolition and renovation sites as well as private customers, architects and engineers who need a consultancy.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes providing consultancy and assessing the potential for site reuse, assistance in the drafting or technical specifications, project planning and logical support. Addi-

tionally, the company remove materials deemed fit for reuse and follow the sale part, arranging for national and international shipping thanks to the web shop.

REVENUES:

Revenues are made depending on the offered service. The company removes reusable materials and the client pay a fee per material type per ton, with costs lower than classical demolition. For the customer, the cost of the service of consignment sales is typically about half of selling price. Moreover, there are additional revenue streams for consultancy, brokerage and historic preservation, which depend on the complexity of the project.

COSTS:

The company removes materials from sites so there are transportation costs, followed by costs of the warehouse and personnel expenditures for the deconstruction, consultancy and customer support.

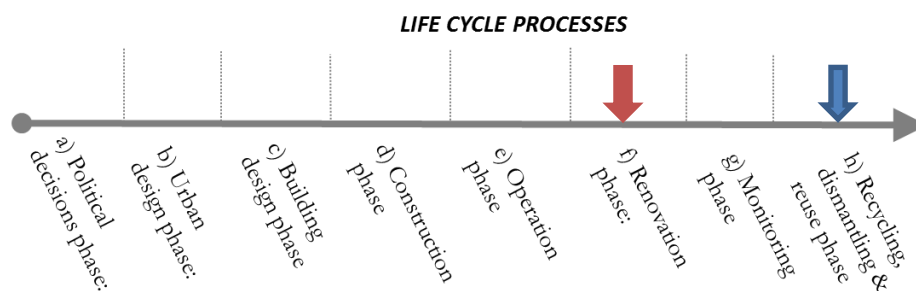
STRENGTHS AND KEY FACTORS:

- ✚ Lower demolition costs
- ✚ Easy assessment of the value of materials (requires only some pictures)
- ✚ Avoiding the accumulation of waste but give it a new life.
- ✚ Reuse strategy tailored according to the requirements of the client

MATURITY:

The company is a young actor in the field of salvaged building components. However, in the last years it has received some awards for sustainability and ecodesign.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 20: CONSTRUCTION COMPANY

Screenshot: <https://www.progroup.eu/>

VALUE PROPOSITION:

The company offers the realization of sustainable constructions and real estates, respecting budgets and deadlines. It is specialized in interior fit-out and interior design, too. Moreover, it is involved in project development and urban planning. It is committed to defend its clients' interest and to minimize the risks of their real estate and construction projects. By a permanent search of innovative solutions combined to a rigorous execution, it creates positive and measurable impacts.

CUSTOMER RELATIONSHIPS:

The company uses its website to get in touch with the costumers and to show past projects. Its team works in strict contact with customers in order to realize the best final solution.

CUSTOMER SEGMENT:

The offer is directed at families wishing to build their own home as well as private and public investors all of which emphasize on sustainable and energy efficient buildings and innovative solutions.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes providing the necessary information for customers, consultancy, and intermediation of architects and designers. The

integrated design approach is particularly interesting in the early conception phase of a project. The principle is to bring together all important actors, in order to create a different environment which allows the heterogenic team to produce optimal results.

REVENUES:

Revenues are made depending on the relevant contract and the company is rewarded according to the time spent on building the project.

COSTS:

The costs are related to the planning phase of buildings and projects. Other costs come from consultancy and customer support.

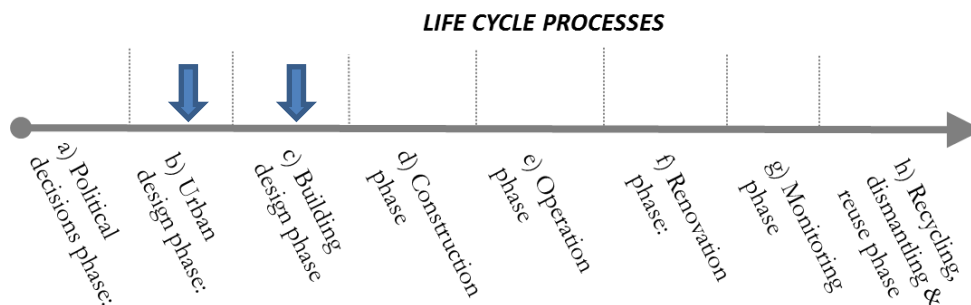
STRENGTHS AND KEY FACTORS:

- ✚ Innovative and sustainable solutions
- ✚ Client and result oriented
- ✚ Respect of budgets and deadlines

MATURITY:

The company is leading in its sector because it is focused on clients and innovation, It was founded in 1996 and its team is composed by qualified architects, engineers and designers.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 21: CONSULTANCY

Pending

BM 22: TRADING PLATFORM

Pending

BM 23: CONSTRUCTION COMPANY

Website: <https://planetreuse.com/>

VALUE PROPOSITION:

The company makes easier to incorporate reclaimed building materials into projects around the world. It is the place to find all reclaimed, reused or remade things for new houses and it connects buyers and sellers of reused materials. It, also, offers the possibility to work on real projects in order to provide a new perspective on reuse opportunities.

CUSTOMER RELATIONSHIPS:

The company uses extensively social media, mobile applications and the website in order to get in touch with the costumers. In particular, on the website all the awards and articles related to the company published by press and media are shown in order to build trust. If it is involved in the realization of a project, its architects collaborate with the design team to integrate reused materials.

CUSTOMER SEGMENT:

The offer is directed at architects who want to include reused materials in their projects as well as contractors who want either to buy or to sell reused goods. The company also refers to homeowners who seek remade materials for their houses and to resellers who want to sell them.

ACTIVITIES AND CAPABILITIES:

The company offers to costumers the possibility to post inventory on the Marketplace, their website, Facebook and Twitter in about 43 seconds. Moreover its architects are specialized to integrate projects in order to introduce more and more reused materials.

REVENUES:

Revenues come mainly from projects, where the need for the expertise in incorporating reclaimed materials is greater. So the company works as a consultant on a lump sum or hourly basis. As a broker, it earns a fee upon sale, which is incorporated into the material cost.

COSTS:

There are fixed costs, related to indirect structure for marketing, project management, product development, consultancy and customer support. Other costs are related to the consultation of expertise architects involved in projects.

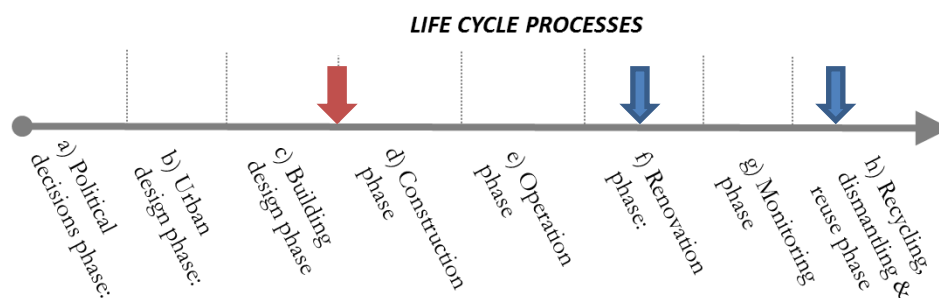
STRENGTHS AND KEY FACTORS:

- ✚ Use of technologies and social media
- ✚ Fast and easy use of its instruments
- ✚ Sustainability
- ✚ Customer support

MATURITY:

The company was founded by an architectural engineer with construction expertise, so its consultants know the design and construction world and can help make the most of reclaimed materials.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 24: ASSOCIATION: GREEN BUILDING COUNCIL ITALIA

VALUE PROPOSITION:

Association and platform for advocacy, networking, and conduct of activities for building sustainability. Italy's primary point of contact for sustainability in the construction sector.

Sustainability is profitable. Green buildings consume less energy (24-50%), produce less emissions (33-39%), consume less water (40%) and produce less solid waste (70%).

CUSTOMER RELATIONSHIPS:

GBC Italia holds events and has marketing campaigns dedicated to the attainment and maintenance of members.

CUSTOMER SEGMENT:

Building professionals/consultants, architects, planners, engineering firms, construction firms, material producers and suppliers, public administrations, universities, real estate and asset managers.

ACTIVITIES AND CAPABILITIES:

Certification, Training, R&D, Advocacy, Communication and Events.

REVENUES:

Member dues are the primary source of revenue. Certifications, training and events (registra-

tion/sponsorship) may have small revenues, but the intent is to recoup costs and not generate profit. GBC Italia is a non-profit and its mission is to develop and promote sustainability in the built environment – not generate profit.

COSTS:

Staff costs, marketing costs, event costs, costs related to training, costs related to working groups / protocol development, costs related to association maintenance and governance.

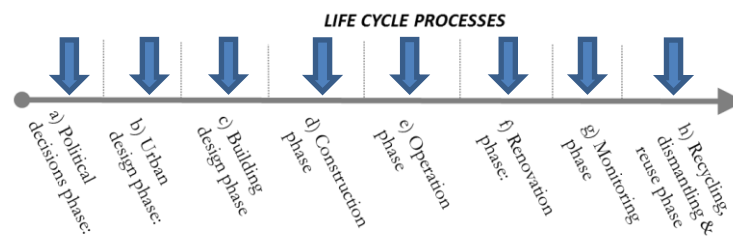
STRENGTHS AND KEY FACTORS:

- ✚ GBC is the largest sustainability network worldwide. 70 countries. 25000 companies. 24000 professionals. In Italy, approximately 300 organizations.
- ✚ Protocols (LEED, BREEAM and WELL) are the most recognized and used in the world
- ✚ Collaborative network of 27 national GBCs across Europe

MATURITY:

GBC has its origins in the 1990s. GBC Italia in 2008. 13 Chapters are active in Italy (regions). GBC Italia has developed several "Made in Italy" protocols which may be internationalized (GBC Historic Buildings as one example).

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 25: GOVERNMENT INITIATIVE: GREENDEALS NETHERLANDS

VALUE PROPOSITION:

Act to remove bureaucratic obstacles that impede the development of green initiatives in all fields, such as:

- Removing obstacles in legislation
- Network creation and Knowledge bridge
- Access to capital markets

When initiatives are enrolled, the average time to market is between two and three years.

CUSTOMER RELATIONSHIPS:

Clients are managed according to different fields, to provide specific support to the initiatives. Main topics fall into: energy, climate, construction, raw materials, mobility, etc.

CUSTOMER SEGMENT:

Companies, social organizations, local governments are eligible to get support

ACTIVITIES AND CAPABILITIES:

Procurement, scouting of funding sources, R&D.

REVENUES:

The initiative promotes sustainability in the built environment at no cost for the final client. It is funded by the Dutch Government (Economic Affairs, Infrastructure and Environment, Interior and Kingdom Relationship).

COSTS:

Staff costs, marketing costs. No extra cost as the initiative owners does not receive money.

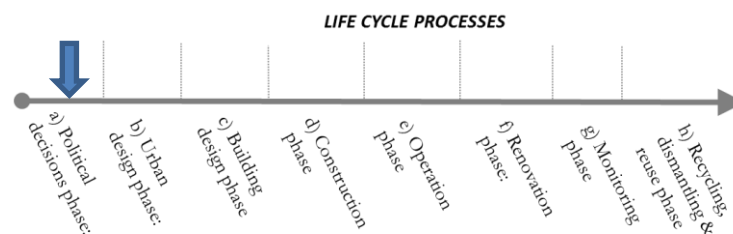
STRENGTHS AND KEY FACTORS:

- ✚ Green deals has supported more than 200 deals so far
- ✚ Covering projects in 9 different fields, 10% of them in the construction sector, 30% related to energy
- ✚ Newsletter on sponsored project to promote the model

MATURITY:

Green Deals started in 2011.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 26: EPEA - EARN MONEY WITH C2C-CONSULTING

Website: <http://www.epea.nl/circularity-passports/>

VALUE PROPOSITION:

The Cradle to Cradle (C2C) design concept is a unique feature, which covers the entire range of process and product development. EPEA develops and innovates products as well as processes. Tools for upcoming challenges, for example by analyzing the transformation potentials of companies and by evaluating products and materials regarding their compatibility for the bio- and technosphere, are offered by EPEA. Cradle to Cradle certified products are available at www.c2ccertified.org.

Circularity Passports® generate value by mapping the possibilities and value for reuse and recycling of products and materials at various levels and making them available for the right parties and at the right time. By closing the information gap in the value chain, Circularity Passports® pave the way for products and projects in the direction of circularity.

CUSTOMER RELATIONSHIPS:

Michael Braungart, who is professor at different universities and headed the chemistry section of Greenpeace Germany in former days, is CEO of EPEA. His network and some participation in European projects like BAMB - Buildings as Materials Banks (BAMB) under Horizon 2020 create various contacts. The C2C certification scheme is actively advertised.

CUSTOMER SEGMENT:

The offer is directed at business, science and public partners, who pay for the C2C-certification of their products, processes, etc. The clients of course have strong commitment to circular economy and remanufacturing processes.

ACTIVITIES AND CAPABILITIES:

EPEA offers desk work and service to facilitate the sharing of information, the recovery of raw materials and value, and new circular revenue models. EPEA develops a tool for all stakeholders involved. EPEA applies Circularity Passports® in projects at different scale levels, for example in a new municipal office, in which various materials and products will be provided with passports. This is in line with the ambition to make optimum use of the residual value of a building and its materials and products.

REVENUES:

Revenues come from the consulting-services, and from European project participation also selling knowledge there. Customers pay for services like certification and product or process consulting.

COSTS:

The costs are composed of wages for the experienced staff, office equipment and costs for renting office space. Of course there are also costs for staff trainings on technologies and consulting knowledge.

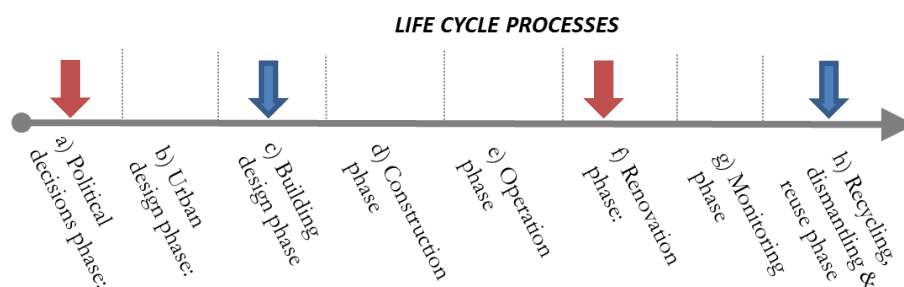
STRENGTHS AND KEY FACTORS:

- ✚ All in one know-how for circular economy consultancy services
- ✚ Innovative approach to create and develop future oriented products and processes
- ✚ Very intensive customer relationship and support if requested

MATURITY:

EPEA is the first address if talking about services and know-how around Cradle to Cradle solutions. It is consulting and certification body of this innovative concept and has good public feedback.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 27: ENGINEERING COMPANY - ELECTRICAL SERVICES

Website: <https://www.schneider-electric.com/en/about-us/company-profile/>

VALUE PROPOSITION:

The company offers complete solutions to increase comfort and productivity of occupants while maximizing energy efficiency and sustainability. The services are related to electrical distribution system, IT infrastructure, control devices, integrated facility management and energy solution. The purpose is to create a smart building that is outstanding operationally and environmentally.

CUSTOMER RELATIONSHIPS:

The customer can experience the latest technologies following the “Innovation Summit World Tour” and join leading conferences worldwide. A detailed website can answer to all the questions or it is possible to contact the customer support; the customer can find online catalogs or call a consultant. On the website are shown references of previous projects with description of the problem, solution adopted and benefits obtained.

CUSTOMER SEGMENT:

All technologies are designed for buildings: from a steelwork, to a hotel or a residential house. There are solution tailor made for all customers from all over the world.

ACTIVITIES AND CAPABILITIES:

The company delivers programmable control and 24/7 monitoring of HVAC, lighting, and metering; reduces energy waste and increases comfort. Moreover, are offered building management system, critical power, electrical distribution and industrial automation services. Finally consulting services can help the client to optimize energy, operate efficiently and maximize profitability.

MATURITY:

REVENUES:

Revenues are made depending on the relevant contract. The company offers customer made services in residential markets with small building but also in industrial and construction markets, with different revenues. Moreover, there are additional revenues from consultancy, electric installations, maintenance and renovation.

COSTS:

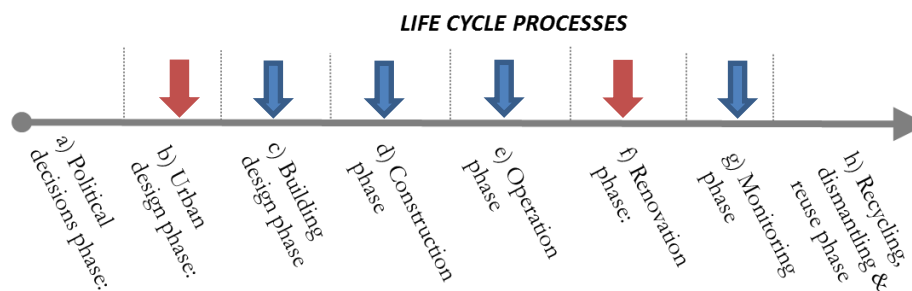
The company produces their products for all solutions and this is the most expensive expenditure; another important part of costs is represented by personnel expenditures for the installation phase, consultancy and customer support.

STRENGTHS AND KEY FACTORS:

- ✚ Immediate energy savings, quick ROI and green contribution
- ✚ Reduced maintenance issues and repair costs
- ✚ Wireless technology with minimal interruption to business
- ✚ Clear and exhaustive website, with an important case history

MATURITY:

The company has a long history, born during the first Industrial Revolution it continues to deliver innovation at every level. Thanks to previous projects it is possible to use data from other buildings to improve future efficiency and to offer best solutions to new customers



Placement of nZEB business models along the value chain

BM 28: POLITICAL ENTITY-LIFE CYCLE COSTING

Website: <https://www.gsa.gov/>

VALUE PROPOSITION:

The company provides workplaces by constructing, managing, and preserving government buildings and by leasing and managing commercial real estate. Its acquisition solutions offer private sector professional services, equipment, supplies, and IT to government organizations and the military. Moreover, it promotes management best practices and efficient government operations through the development of government wide policies.

CUSTOMER RELATIONSHIPS:

It serves the public and makes government easier by offering free access to information about government programs with specific websites. There are some e-tools for citizens to make easier the sale. A live chat is available, or you can directly contact the staff via telephone hotline.

CUSTOMER SEGMENT:

The offer is mainly directed at federal agencies, state agencies and public organizations. Substantial savings are provided to the Government through specific services.

ACTIVITIES AND CAPABILITIES:

It supports reductions in federal government real estate costs and increases in workplace efficiencies by strategically integrating space, people, and technology solutions customized to different workplace needs.

REVENUES:

The company provides centralized procurement for the federal government, offering billions of dollars' worth of products, services and facilities that federal agencies need to serve the public. The majority of costs are recovered through intra-governmental sales of goods and services and only one percent is provided through direct congressional appropriations.

COSTS:

There are some operating expenses during building operations and acquisition services. The society pays for goods and services and provides capital maintenance.

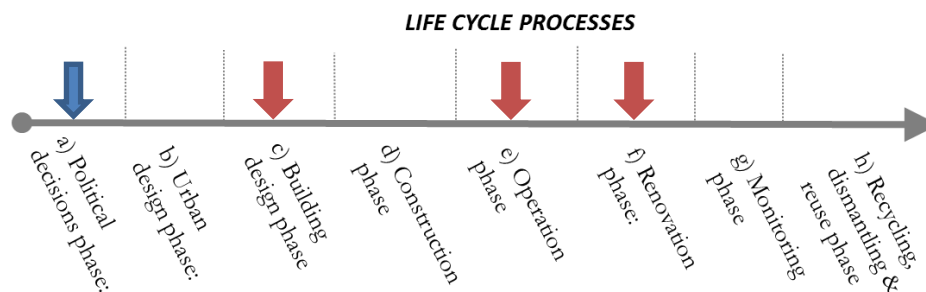
STRENGTHS AND KEY FACTORS:

- ✚ Smart management of Federal real estate to save taxpayer money
- ✚ Buying experience
- ✚ Premier provider of efficient and effective acquisition solution across the Federal Government.
- ✚ Customer loyalty

MATURITY:

The company has a long history and thanks to its experience improves the way Federal agencies buy, build and use technology.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 29: VENDOR OF TECHNICAL EQUIPMENT

Pending

BM 30: ENERGY SUPPLIER-PV-SYSTEMS, STORAGE AND ELECTRICAL CLOUD SERVICE

Website: <https://www.enbw.com/solar>

VALUE PROPOSITION:

Through the installation of a PV-system, battery storage and the use of a virtual electrical cloud account (excess energy in summer flows into a virtual power account, so if the system does not cover the power consumption in winter, energy will be taken from the grid) the company provides the customer a potential savings of electrical energy costs of about a quarter over a period of twenty years in the power consumption of a four-member family. Theoretically the client can use his cloud electricity at any charging station for electric cars.

CUSTOMER RELATIONSHIPS:

In order to get in touch with customers the company provides brochures, a detailed website with the possibility to get in contact with a regional personal consultant. References projects are shown on the web site. The company offers the whole process of engineering, installation, maintenance and guaranty during the whole life cycle of their products. Several offices overall in Germany proposes a timely service. Personal assistance, also via telephone hotline as well as internet and the offer of maintenance services helps building a long-term customer relationship.

CUSTOMER SEGMENT:

This offer is aimed at private households. Several possibilities for business clients are available.

ACTIVITIES AND CAPABILITIES:

EnBW is one of the big energy suppliers in Germany. In an increasingly differentiated market with state-subsidized, decentralized and renewable energy generation, it is a challenge for large providers

to place adequate products and services. Among other things, this business model helps to cope with the changing market situation. It covers a large segment of the Life Cycle Process of the products. Meanwhile 18.000 plants are in operation and 500 partner companies are contact partners and provide support in Germany.

REVENUES:

Revenues are made depending on the relevant contracts. The company offers different contracts depending on the planed PV and battery size and the customer-chosen monthly paid cloud packages. The company provides the necessary information platform and billing logistics. The planning phase and component delivery takes place via a subsidiary (<https://www.senec.com/>) and partners

COSTS:

General administration costs; accounting channels of the main business can be used

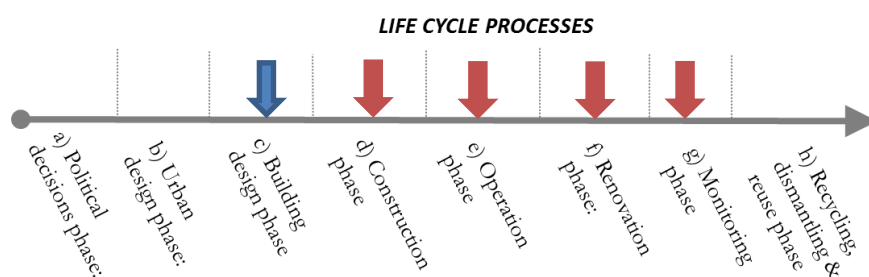
STRENGTHS AND KEY FACTORS:

- ✚ Coordination of the Planning, construction and accounting from one hand
- ✚ Business model to enforce the customer loyalty and built long term relationship
- ✚ Customer uncertainty is reduced by the complete package

MATURITY:

The company has a long history and experience as energy supplier. Distribution, marketing, account management and market acceptance are established.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 31: WASTEWATER HEAT RECOVERY SYSTEM – EHTECH

Website: <https://www.ehtech.fr/home>

VALUE PROPOSITION:

The company offers a new solution to recover energy from the waste water coming from various sources. Obox is a heat recovery unit for your hot waste water: it allows you to save 63% to 80% of your hot water energy bill by heating the water that supplies the water heater (gas, electric or other) and the cold water of the mixer. The efficiency of the exchanger is maintained and guaranteed through innovative backflow self-cleaning system. The device is remotely supervised in order to detect any problem in the system before happening and for ease of maintenance.

CUSTOMER RELATIONSHIPS:

The company developed a business to business strategy, where they specified with consultancies firms performances and technical solutions for the implementation of their innovative product. They have also a direct client relationship through their monitoring and maintenance offer.

CUSTOMER SEGMENT:

The offer is dedicated for various type of customers with high hot water consumption rate. Several types of heat recovery are developed depending on the application; for example: residential houses, Hair dresser saloon, sports facilities, swimming pools, hotels and various industries with high hot water demand.

ACTIVITIES AND CAPABILITIES:

EHTech perfectly masters the design of high-performance exchangers and the automated maintenance of their performance over time, even under extreme operating conditions. Because EHTech's technology is new and innovative, EHTech has filed and obtained 7 patent Applications, extended in 9 countries including the United

States. EHTech's technological lead has been rewarded with 10 international awards in France, Europe and the United States.

REVENUES:

Revenues of the company will be made firstly by selling devices for small application (residential, hair dressing saloons...) and installation for large applications (hotel, swimming pools, industry...). In addition, supervision and maintenance contracts are proposed for the client to commit on the performance.

COSTS:

The box consists of several mechanical sub-systems coming various suppliers and assembled together in one box by EHTECH. Additional costs are: administrative, R&D and manufacturing.

STRENGTHS AND KEY FACTORS:

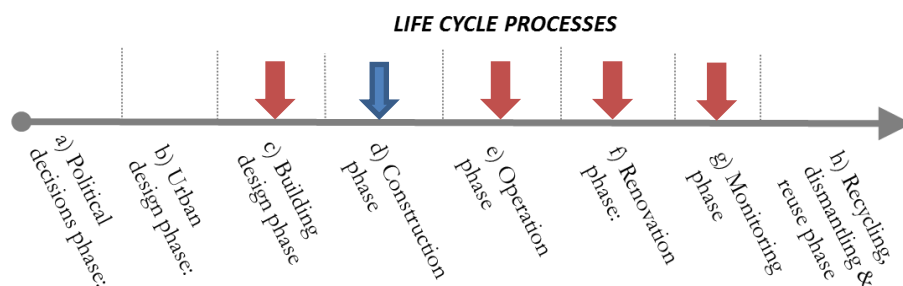
- ✚ Energy saving up to 80% on hot water
- ✚ Warranty of the performance during the whole life of the system
- ✚ Short payback period <5years
- ✚ Online supervision IoT

MATURITY:

EHTech has been developing its heat recovery systems for more than 9 years. Seven heat recovery kinds for domestic, collective and industrial wastewater have been launched on the market and sold in excess of 400 units in 7 countries.

The obsession with efficiency consistency is EHTech's identity and the heart of its patented technology. And in 9 years, EHTech's customers have put their heat recovery systems to the test of the most severe and diverse fouling!

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 32: VENDOR OF SOLAR HYBRID MODULES

Website: <https://dualsun.com/fr/>

VALUE PROPOSITION:

DualSun developed the first hybrid solar panel certified in the world that generates simultaneously electricity and hot water. It generates 3 times more energy than a standard photovoltaic panel. With zero risk of overheating and by optimizing rooftop space, the DualSun hybrid panel is the best solar technology for all types of buildings and applications: hot water production, pool heating, and space heating by coupling with heat pumps and/or geothermal. As a proud PV CYCLE member, the DualSun panels can be recycled up to 80% with an average lifetime of 30 years.

CUSTOMER RELATIONSHIPS:

DualSun is a manufacturer that works with integrators (other large manufacturers such as DAIKIN or Heliopac) to integrate DualSun technology into their offers. DualSun works closely with its integrator customers to co-develop offers and marketing material and to provide technical and sales training and support. The integrator customer will then promote and distribute the DualSun offer via its commercial distribution channel (integrator > installer > end-customer).

CUSTOMER SEGMENT:

DualSun targets all homes and buildings with electricity and low-temperature hot water needs, however, distinguishes two main segments, which are residential: individual homes and commercial: apartment buildings, municipal swimming pools, campings, hotels, etc.

ACTIVITIES AND CAPABILITIES:

DualSun invests heavily in research, development and industrialization, and continually strives to improve its technology – increase performance and cut costs. DualSun also has a dedicated technical

team that works to improve system design and performances and costs to provide not just a panel, but full solutions that make sense. Finally, DualSun values and invests in quality customer service and marketing (press, web, lead generation) to build its brand and create demand from the end-user.

REVENUES:

DualSun's primary revenue stream is selling high volumes of panels to its integrator customers. Other revenue streams include selling leads to partner integrators or installers and selling a simulation platform (MyDualSun) as a white label service to integrator customers.

COSTS:

Production and research and development.

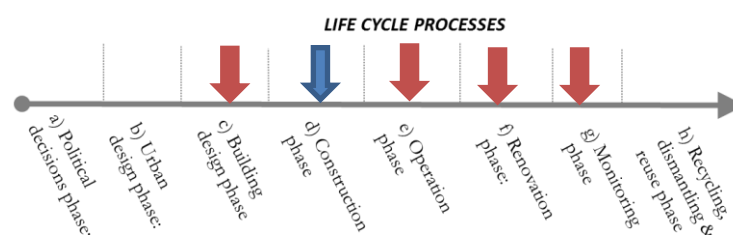
STRENGTHS AND KEY FACTORS:

- ✚ Performance: 3 times more energy than standard PV panel
- ✚ Optimized rooftop space
- ✚ Cost: most competitive hybrid solar panel on market
- ✚ Key solution for responding to new building regulations
- ✚ Low stagnation temperature: no risk of overheating, no negative impact on PV performance, simplified maintenance
- ✚ Quality and durability: European certifications, designed and assembled in France

MATURITY:

After 3 years of research and development, DualSun commercialized its first hybrid panel in late 2013. Over the past 5 years, nearly 1000 buildings have been equipped with DualSun installations.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 33: ENGINEERING COMPANY

Pending

BM 34: ONE-STOP ENERGY PROVIDER - VISHARE ENERGY COMMUNITY

Website: <https://www.viessmann.de/de/vishare-energy-community.html>

VALUE PROPOSITION:

Viessmann not only sells products like heat pumps, PV- and battery storage systems, but also runs a so called “ViShare Community”. It is operated by an own affiliate, the Digital Energy Solutions company, which was found together with the German BMW group. The purchase of Viessmann energy systems is the costumers’ ticket to this ViShare Community. The ViShare flatrate and electricity from Viessmann for private customers is

- 100% sustainable
- 100% independent
- 100% cooperative

In ViShare, the Viessmann Energy Community - private electricity producers and consumers - is joining forces to form a smart network that shares 100% of the jointly generated, sustainable energy.

CUSTOMER RELATIONSHIPS:

Viessmann offers the ViShare flatrate and a specific electricity tariff only to costumers buying a specific minimum equipment of their energy systems portfolio. That’s the entrance to the “Community” using the advantages there. In order to get in touch with customers the usually marketing ways of Viessmann are used. The slogan: ‘Produced together - supplied together’.

CUSTOMER SEGMENT:

The service is directed at mainly private households and building owners who want to share PV-produced power and be supplied with green power in times when the own PV-production fails.

ACTIVITIES AND CAPABILITIES:

The electricity that costumers generate but not consume or store is fed into the grid. This amount

of electricity benefits the other community members. At the same time, costumers are credited with this amount of electricity and get the same amount from the community for free at any time. This way one can use the electricity that the system produced during the summer without any additional costs in winter, although it may physically be totally different generated power.

REVENUES:

Revenues come from the feed-in tariffs, which are kept by the company, and by the individually calculated flatrate and specific household electricity tariffs, paid by the costumers. Additionally, more energy system products can be sold because of the marketing effect of the ViShare Community “spiral”.

COSTS:

The costs are composed of production and/or assembling of the energy system products. A lot of person power runs into one-stop service and marketing. Some costs also go to the establishment of contracts and legal advice, handling of insurance and subsidies, training on technologies.

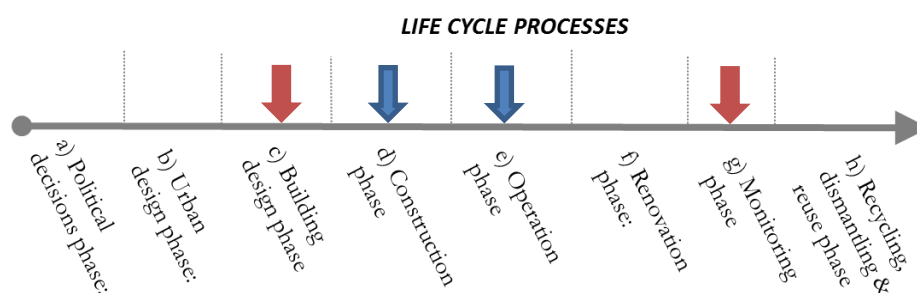
STRENGTHS AND KEY FACTORS:

- ✚ Fine-tuned one-stop energy system
- ✚ Processing of generation, consumption and feed in with a fixed monthly community tariff
- ✚ Perfect customer loyalty

MATURITY:

Viessmann is all in one supplier of the home energy system, selling affordable electricity via the own ViShare Community.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 35: PUBLIC FINANCING SUPPORT FOR NZEB-BUILDINGS, RENOVATION AND RENEWABLE ENERGIES

Website: <https://www.kfw.de/kfw.de.html>

VALUE PROPOSITION:

CUSTOMER RELATIONSHIPS:

Public-sector financial service provider, distribution of state subsidies in the form of repayment subsidies and subsidized loans for new apartments / new housing and energy renovation of existing housing as well as installation or renewal of energy, heating and DHW systems. In the case of financing a new building, the amount of the subsidy is based on the calculated energy standard. The better the standard, the higher is the subsidy amount. Applications can be submitted through banks and agencies as part of a financing plan. The calculation of the energy standard is needed and requires a certified expert whose construction-related activity is also supported.

CUSTOMER SEGMENT:

The offer is wide spreaded. Both private, commercial and public builders benefit from the promotional offers.

ACTIVITIES AND CAPABILITIES:

The bank was founded in post-war Germany to accelerate the reconstruction of the economy, agriculture and the construction of housing. In addition to export, global environmental protection and national SME financing, the focus of activities is the subsidization of energy-efficient construction and renovation of buildings as well as the promotion of renewable or energy-saving energy systems. In this respect, the Bank is a means to support political goals and guidelines in the field of NZEB buildings through promotional offers. In the NZEB area the funding offers are linked to the participation of an accredited energy consult-

ant. This advisory role is outsourced, but of great importance to meet the information needs and uncertainties of the client regarding the necessary measures and available technologies.

REVENUES:

Revenues are made through the interest earned on the contracts concluded and the state subsidies for certain public support measures.

COSTS:

The main costs are the general administrative costs of the bank. The tendering and release of funding is technically outsourced to the energy consultant and financially to the main financier of the projects. The procedure works for private customers, cost-reduced, online.

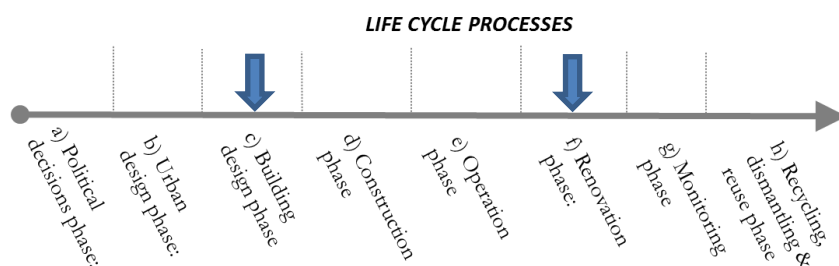
STRENGTHS AND KEY FACTORS:

- ✚ Low credits (below the interest rate level of the "normal" capital market) for the establishment of higher-quality energy and technology standards in existing buildings and new buildings
- ✚ Easy access to web-based information and online finance calculation
- ✚ secure financing planning through the possibility of determining the term of the loan itself
- ✚ Subsidies are based on energetic and financial advisors

MATURITY:

The company has 70 years of tradition and experience in their field of work. The offer is regularly adjusted to market needs and political conditions.

PLACEMENT ALONG VALUE CHAIN OF NZEBs.



Placement of nZEB business models along the value chain

BM 36: FEDERAL AGENCY-FUNDED EFFICIENCY PROGRAMS

Website: http://www.bafa.de/DE/Energie/energie_node.html

VALUE PROPOSITION:

The Federal Office of Economics and Export Control (BAFA) offers various funding programs in regard to energy in buildings. The main areas of funding are: Energy consulting (for various stakeholders), Energy efficiency measures (e.g. e-mobility, optimization of heating system, cooling devices, energy audits and management systems) and “heating with renewable energies” (such as biomass, solar thermal energy, heat pumps and very efficient conventional heating systems). Thereby customers are given incentives for investing into measures and technologies that will contribute to more efficient energy systems, less energy costs and CO₂ emissions and less dependency on fossil fuels with its’ possibly rising costs.

CUSTOMER RELATIONSHIPS:

In order to get the funding needed, there are online processes possible that can be found on the website. Moreover, the Federal Ministry of Economic Affairs and Energy (BMWi), on which behalf the BAFA is operating, provides a customer support hotline and a list of approved consultancies that can help.

CUSTOMER SEGMENT:

The offer is directed at various different customer segments such as private households, companies, municipalities, and other institutions.

ACTIVITIES AND CAPABILITIES:

The BAFA is in charge of the administration of all funding programs designed by the Federal Ministry of Economic Affairs and Energy (BMWi). The Federal Ministry itself is in charge of the development and constant revision of the different funding programs as well as the supervision and evaluation of its’ effects.

REVENUES:

The German government provides 17 billion Euros between 2016 and 2020 for the funding of energy efficiency measures and programs as administrated by the BAFA.

COSTS:

Since it’s a Federal agency, the costs are taken care of by the state. All programs are funded by the government.

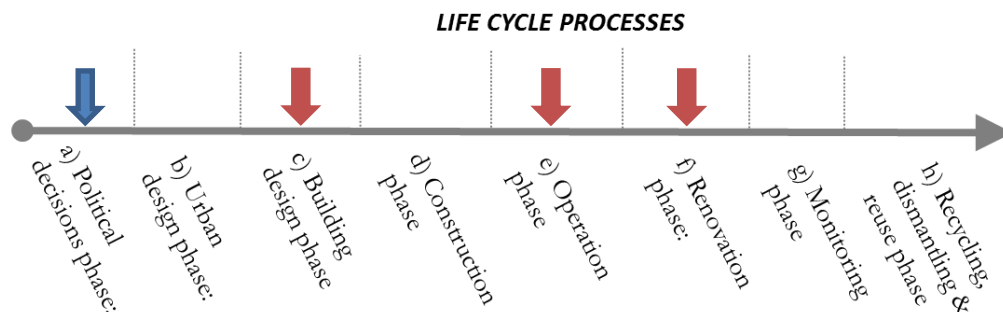
STRENGTHS AND KEY FACTORS:

- ✚ Financed by the state
- ✚ Auditors who take care of the supervision

MATURITY:

In 2000 the BAFA was built with the former Federal Agency for Economics (BAW) and Export (BAFA). Due to the wide range of different tasks the BAFA is today a universal agency within the Federal Administration.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 37: CERTIFICATION ENTITY - FOR SUSTAINABLE AND RESSOURCE EFFICIENT BUILDING

Website: <http://bau-irn.de/>

VALUE PROPOSITION:

The institute offers the BNK-certificate (BNK=Evaluation system for sustainable small residential buildings). The support and consulting during the planning and construction phase of buildings is optional, reducing the risk of bad planning. The certification enables building owners to sell or rent their houses and flats at higher prices. Building part suppliers, architects and building developers that hold the certificate guarantee their customers high quality standards of their work. Projects that have been certified accordingly have a very high standard in terms of socio-cultural, functional, economical, ecological and process related quality.

CUSTOMER RELATIONSHIPS:

The institute seems trustworthy for customers as it is established by both a federal ministry and a university making it officially accepted and their concept based on throughout research. The customers moreover gain confidence in the offer as it includes guidance right from the beginning. The quality standard needed and the expertise required of auditors is another argument supporting customers in their purchase decision.

CUSTOMER SEGMENT:

Possible customers are building owners wanting to lower their long-term costs or increase the building's worth or suppliers, architects and developers wanting to proof their products/ projects/ services quality to customers.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes guiding and consulting developers, owners and suppliers during the

building process, giving seminars and training new BNK-auditors and drawing up the certificates. Moreover, the institute constantly works on the BNK-system and promotes sustainability in the built sector.

REVENUES:

The institute is financially supported by the University of Applied Sciences, Munich. Apart of that it generates revenues with the annual fees for giving BNK-auditor and supplier licenses and the required seminars. The main revenue stream is the price for the building's/project's BNK-certificate according to the contractual obligations agreed on.

COSTS:

The task of the institute is the guidance and consulting during the building process as well as the official draw up of the certificate. Accordingly, the main expenditures are of personnel nature.

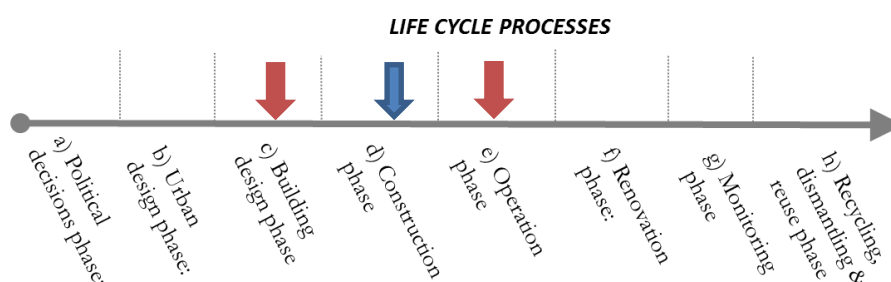
STRENGTHS AND KEY FACTORS:

- ✚ Voluntary employees
- ✚ impartial, proficient, responsible
- ✚ certificates can be partly funded by KfW
- ✚ officially accepted (BMUB) certificate
- ✚ includes more than ecological and energy-related quality aspects

MATURITY:

The institute has been found in 2015 as a consequence of the development of the BNK-system co-created by the University of Applied Sciences, Munich. Due to their strong research background the maturity of the overall business model is already established.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 38: CONSTRUCTION COMPANY-PREFABRICATED HOUSES

Website: <https://www.polarstern-energie.de/>

VALUE PROPOSITION:

Ecological electricity (hydropower) and gas (biogas using organic waste products), making “Energiewende” possible for everyone: Engaging in projects in Kambodscha and Mali providing renewable energy solutions for the people. As a company, preparing the GWÖ every second year that evaluates a company’s performance on solidarity, fairness, ecological sustainability, human dignity, transparency and co-decision. Offering different tariffs like “domestic electricity”, “Car electricity”, “renters electricity”, “heat-pump”, “high/low temperature” and “night storage electricity”.

CUSTOMER RELATIONSHIPS:

According to “ekom”, an independent provider for ratings and reviews, the company was rated the most customer friendly energy provider in Germany. Communication on an equal footing with customers, direct, honest. Personal. They take care of strong partnerships with emphasis on strong communication. Moreover a touring exhibition of pictures and information about their projects in kambodscha can be used to show, as a business partner, how socially responsible it is.

CUSTOMER SEGMENT:

- Both private and business customers
- People and companies who want to engage in climate protection not only in Germany but help poorer people engage too

- Companies who produce sustainably and want to start with their energy consumption
- Energy coupons

ACTIVITIES AND CAPABILITIES:

The company’s activities are customer support, energy concepts, special events to raise awareness and spread information such as Clean-ups, earth-hour-events and open forums.

REVENUES:

Revenues for providing different electricity and gas options to private and business customers (height of the revenue depends on tariff).

COSTS:

- purchase of gas and electricity
- customer support
- salaries
- 20 €/ customer and year to support renewable energy projects in Mali and Kambodscha

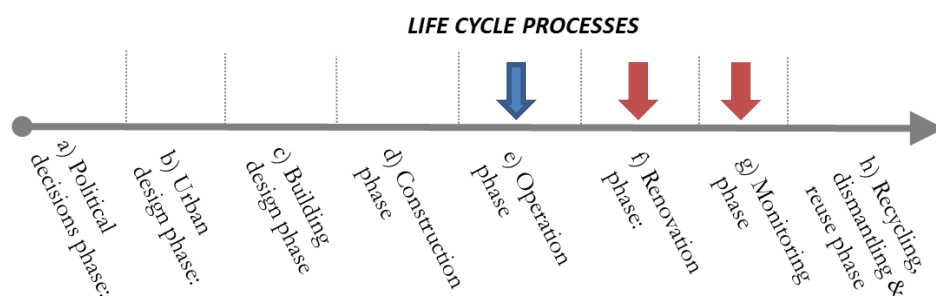
STRENGTHS AND KEY FACTORS:

- ✚ Customer relationship and communication
- ✚ Good image due to social responsibility
- ✚ Strong partnerships

MATURITY:

The company has a long construction history and can provide clients with technical data from older buildings. These data can be used for e.g. future energy efficiency upgrades and design changes.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs.



Placement of nZEB business models along the value chain

BM 39: BATTERY STORAGE PRODUCER AND ENERGY SUPPLIER

Website: <https://sonnen.de/>

VALUE PROPOSITION:

The company produces solar energy battery storages since 2010. Since 2015 their core business has been extended by providing a sharing platform for renewable electricity. As an energy supplier they offer different kinds of energy tariffs in- and excluding their battery storage option. Thereby they built a decentralized energy community that provides electricity in a smart, sustainable and transparent manner that is affordable for everyone and makes the buyers independent of the big energy suppliers. Moreover, by becoming part of the community one can contribute to the grids load relief making the integration of renewable energies more efficient. The different tariffs, moreover, offer possible additional revenue streams for customers.

CUSTOMER RELATIONSHIPS:

Customers have easy access to information via the company's website; not only in regard to different products and tariffs but also regarding background knowledge about topics in the energy sector. A digital map shows different current customers and gives access to their reviews on the energy community. Furthermore, the company has hotline and customer service via e-mail. Various awards proof the company's quality and innovative approach to current and future customers.

CUSTOMER SEGMENT:

The offer is typically directed at private households that emphasize on using affordable and 'clean' energy. Those people want to take part in the 'energy revolution' that organizes people of the same beliefs in decentralized communities making use of digital technologies rather than relying on big concerns. Customers might already have wind energy or PV installed and wish to increase their usage and economic performance.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes the production, optimization and sale of battery storage systems, customer support and consultancy, optimization and dialog with partners to create attractive electricity tariffs for their customers and the provision of information on their website.

REVENUES:

Revenues are made by selling battery storages. Moreover, depending on the kinds of contracts made with customers, monthly community fees and the sale of electricity are typical revenue streams.

COSTS:

Costs incur for the production of the battery storages, R&D of tariffs and products, cooperation with partners and technical planners and personnel expenditures.

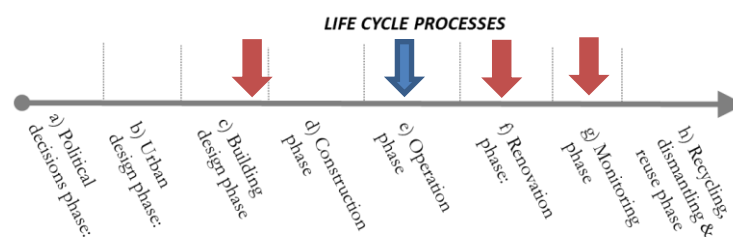
STRENGTHS AND KEY FACTORS:

- ✚ central software for identifying demand and supply at each moment
- ✚ Control centre for balancing demand and supply
- ✚ Strong network of partners like TenneT and IBM
- ✚ Investors like eCapital and General Electric

MATURITY:

The company was found in 2010. Today it has seven sites worldwide and employs around 350 people. Coming from solely producing battery storages the portfolio has been extended with providing electricity. Therefore, the company has been awarded as one of the most innovative ones.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 40: CONSULTANCY - MATERIALS PASSPORT, SERVICE FOR THE TRANSITION TO CIRCULAR ECONOMIES

Website: <https://www.madaster.com/en>

VALUE PROPOSITION:

The company's mission is to eliminate waste by providing materials with an identity. Its platform is designed as a public, online library of materials in the built environment and facilitates registration, organization, storage and exchange of data.

CUSTOMER RELATIONSHIPS:

In order to get in touch with customers the company provides brochures and a detailed website: it is possible to find there all subscription details with prices and descriptions. There is a partner program, intended to create value for customers, partners and the company itself. In case of any problem it is possible to contact the company via e-mail, phone, social networks or filling their contact form.

CUSTOMER SEGMENT:

The offer is directed at real estate owners, property administrators, designers, builders, public sector and private individuals.

ACTIVITIES AND CAPABILITIES:

The company simplifies customer's internal and external communications. All relevant information is at customer's fingertips during the planning and execution phases of building administration and maintenance activities, when preparing tenders for renovation, demolition or new housing developments, as well as for certification, sale or lease purposes. For every building it creates an up-to-date and detailed materials passport, with information about the quality of materials, their location and their monetary and circular value.

REVENUES:

Revenues are made depending on the relevant contract. The company offers different contracts depending on the number of users and the total gross square meters of the building and on the customer segment. For private individuals there is only one cheap solution, instead, for real estate owners, designers and public sector there are four different subscriptions with different prices.

COSTS:

The company offers consulting services and an online platform and focuses on privacy, security and continuity: this part represents the main expenditure. These costs are followed by personnel expenditures for customer support and consultancy.

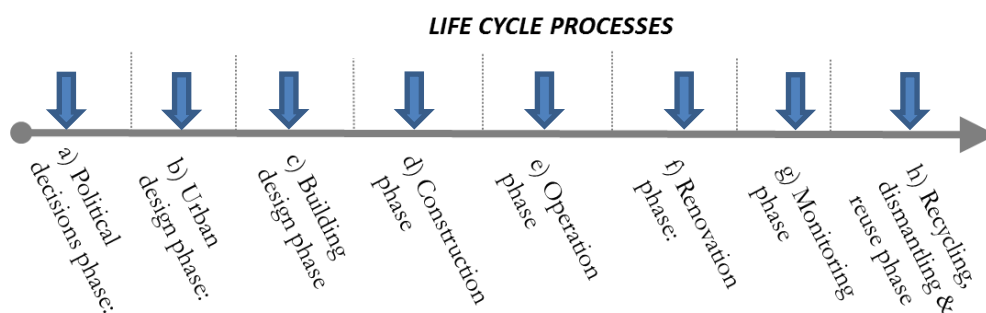
STRENGTHS AND KEY FACTORS:

- ✚ Easy and everywhere available platform
- ✚ Rich and growing library of building specific information
- ✚ Services for all segments
- ✚ Support of important partners

MATURITY:

The company is a young actor and improves continuously its services with new features and functions, extending its product range and entering new markets and industries. This is possible thanks in part to new partners.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 41: MAINTENANCE COMPANY - FACILITY MANAGEMENT

Website: <https://openworksworld.com/>

VALUE PROPOSITION:

The company is a leading facility services company and innovator in the industry. They don't provide only to maintain the facility but add also value to the client's business by improving it. Through their services they create a safer, healthier and more productive work environment. Moreover, they also offer a cleaning service.

CUSTOMER RELATIONSHIPS:

In order to get in touch with customers, the company provides a website, where are shown some customer success stories: for the client it is enough to check previous projects and find one similar case to his need. It is possible to contact the vendor or to go directly in one office. The company gives franchise opportunities.

CUSTOMER SEGMENT:

The business model is focused on creating solutions for commercial and industrial companies across U.S. and internationally.

ACTIVITIES AND CAPABILITIES:

The company provides maintenance services for a wide variety of businesses and facilities; it improves efficiency, savings and reduces costs for the client's company. The results are measurable and add value to the customer's bottom line. Moreover, the cleaning solutions are all sustainable and reduce overall operating costs. Finally, the compa-

ny implements a comprehensive Environmental Management System to facilities to pursue LEED certification.

REVENUES:

Revenues are made depending on the service given to the client. The company offers customized solutions that fit the specific needs of the client; therefore, costs depend on the level and complexity of service required and on the customer wishes.

COSTS:

The company uses its own products during maintenance and cleaning, that is the main cost; it is followed by personnel expenditures and customer support.

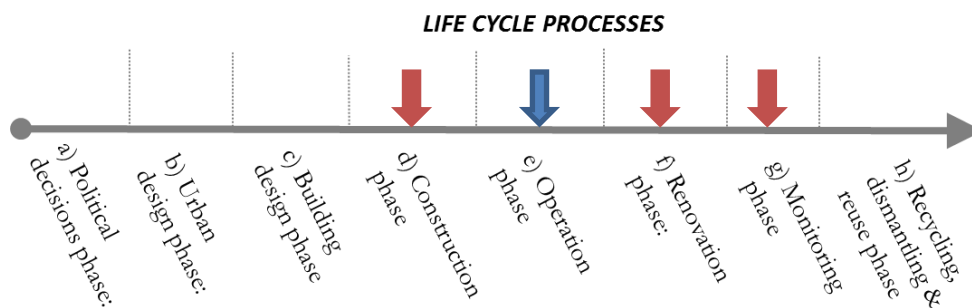
STRENGTHS AND KEY FACTORS:

- ✚ Clean for health and environmental quality
- ✚ Continuous improvement for efficiencies and cost savings for long - term
- ✚ Benchmarking for overall savings relating to facility maintenance
- ✚ Measurable results and transparency

MATURITY:

As a leader with over 25 years of experience in facility services across the U.S.; the most innovative processes, highly trained people and a leading technology are provided.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 42: CONSTRUCTION COMPANY

Website: <http://www.biohaus.it/>

VALUE PROPOSITION:

The company offers prefabricated wood houses, which are designed with a strong attention to sustainability and energetic efficiency; the projects are, usually, very expensive. It offers the possibility to design not only the house itself, but also the garden, the spa and the Ambient Assisted Living. Every house is custom-made and provided with certification like Casaklima, Minergie and Passivhaus.

CUSTOMER RELATIONSHIPS:

The company uses website and social media to promote its projects. It, also, participates to exhibitions, such as Klimahaus and Made EXPO. Moreover, at the end of each single work, it provides the customer with a mobile phone and a SIM card in order to guarantee an efficient after-sales service. There is also a fidelity card through which the customer is always informed about the latest proposals. The company shows its certificates of quality in order to build trust.

CUSTOMER SEGMENT:

The offer is directed at very wealthy customers who are looking not only to a very competent team of architects and designers, but also to a sustainable and technological house.

ACTIVITIES AND CAPABILITIES:

The company offers a complete service in the construction of houses. In the end, the client can

enter the final house. The project is oriented not only in the realization of the building, but also in the design of the garden, the spa and the installment of the Ambient Assisted Living.

REVENUES:

Revenues are made depending on the size of the project. Costs depend on the customers' wishes such as type of building, architectural style, technical equipment etc.

COSTS:

The company produces their building materials and prefab parts itself which is likely to be the most expensive expenditure (resources) followed by personnel expenditures for the construction phase, consultancy and customer support.

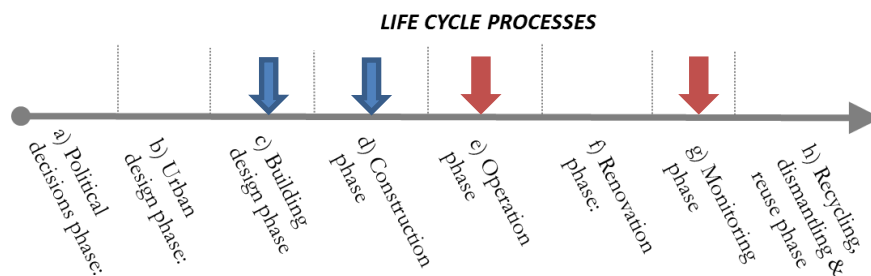
STRENGTHS AND KEY FACTORS:

- ✚ Prefab buildings for faster construction
- ✚ Sustainability and technology
- ✚ Certifications of quality
- ✚ Customer support
- ✚ Custom-made houses

MATURITY:

The company was founded in 1998 by an architect who had been working in this field for 30 years. It has acquired know-how through the collaboration with the most innovative German companies.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 43: CONSTRUCTION COMPANY - DOMUS GREEN

Website: <https://www.domus-green.com>

VALUE PROPOSITION:

The company offers prefabricated houses with very high energetic standards. The realization is entirely in wood and it is very fast. Moreover, the company assures earthquake-proof buildings. The customer can choose between different models of houses or can ask the architects for a personalized project.

CUSTOMER RELATIONSHIPS:

The company uses social media and the website to show prospective buyers its products and its prices. It, also, explains its building methods in order to make the customer understand the high energetic standards that the company has acquired in the years. Moreover, client reviews are visible on the website in order to build trust.

CUSTOMER SEGMENT:

The offer is directed at families wishing to build their own modern and ecological wood house, in a very short time.

ACTIVITIES AND CAPABILITIES:

The company builds prefabricated wood houses, which are constructed with modern techniques, such as X-Lam and Platform Frame. The buildings

are earthquake-proof and can be passive. The customer can choose between different models of houses or can personalize the project with the advice of expert architects.

REVENUES:

Revenues are made depending on the size of the project. Costs depend on the customers' wishes such as type of building, architectural style, technical equipment etc.

COSTS:

The company produces their building materials and prefab parts itself which is likely to be the most expensive expenditure (resources) followed by personnel expenditures for the construction phase.

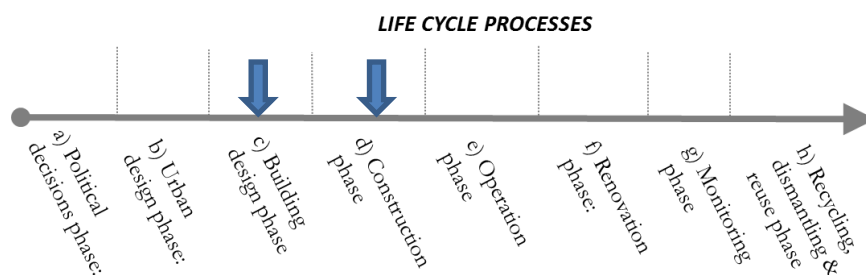
STRENGTHS AND KEY FACTORS:

- ✚ Very fast construction
- ✚ High energetic standards and passive houses
- ✚ Modern building techniques
- ✚ Explanatory website

MATURITY:

The company is in the construction field for more than ten years and builds both in Italy and abroad.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 44: CONSTRUCTION COMPANY- HAUS IDEA

Screenshot: <https://www.kampa.it/>

VALUE PROPOSITION:

The company offers prefabricated wood houses with very high energetic standards. The realization of the house includes foundations and it is custom-made and oriented to satisfy the needs of the customers. The team, also, provides assistance in finding the right place where to build, in obtaining financing and permits.

CUSTOMER RELATIONSHIPS:

The company is not very active on social media and on the website. However, it assists the client in obtaining financing and permits and it is provided with software for 3D rendering, in order to show easily the client how the house will be in the end. It participates to exhibitions and it has open houses that clients can visit.

CUSTOMER SEGMENT:

The offer is directed at families wishing to build their own modern and ecological wood house.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes providing the necessary information for customers, consultancy, intermediation of architects, construction and its supervision as well as optional financing services and customer support. Additionally, the company is provided with a 3D software for rendering.

REVENUES:

Revenues are made depending on the size of the project. Costs depend on the customers' wishes such as type of building, architectural style, technical equipment etc. Moreover, additional revenue streams for financial consultancy are possible.

COSTS:

The company produces their building materials and prefab parts itself which is likely to be the most expensive expenditure (resources) followed by personnel expenditures for the construction phase, consultancy and customer support.

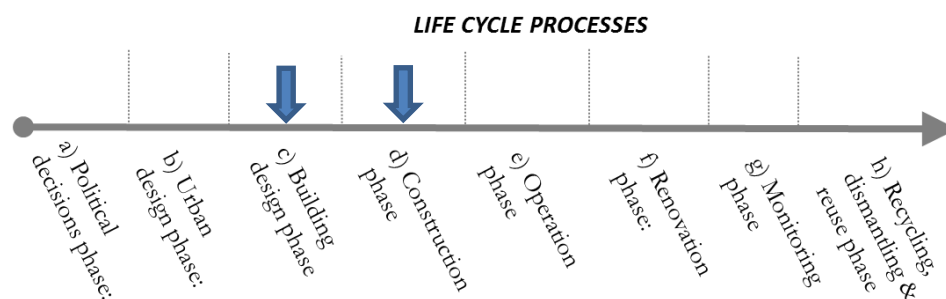
STRENGTHS AND KEY FACTORS:

- ✚ Prefab buildings for faster construction
- ✚ High energetic standards
- ✚ 3D software for rendering
- ✚ Assistance for financing and permits
- ✚ Custom made houses

MATURITY:

The company is partner of Haas, which has recently stopped building in Italy and which allows Haus Idea to sell its products. The company belongs to Kampa group and it produces, more or less, 50 houses every year.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 45: CONSTRUCTION COMPANY: PARTNERING - KRONODAL

Website: <https://www.skanska.se/vart-erbjudande/vara-projekt/218987/Kronodal-Omtankens-hus,-Hollviken/?Query=kronodal>

VALUE PROPOSITION:

Partnering, is a form of cooperation during the building process where the construction company, i.e. Skanska, ensures that experiences and competences are utilized. Through early contractor involvement the key actors cooperate to find the best solutions and opportunities for the client. The overall difference compared to business as usual is the form of procurement, where the contractor is chosen very early, before any major plans or architectural drawings are made. So the procurement decision is based on the key competences and preparedness to do a good job and the profit (percentage of the contract sum)

The Kronodal project (a health care center) is a good example of a partnering project where Skanska could use its green competences firstly to win the contract, but also to influence the client to choose a much more energy efficient and green building than originally planned. The partnering process made a prestudy possible, so that the client could have early information on solutions and costs before starting the design phases, thus setting goals for Deep Green and NetZEB with a budget that would cover the extra investment.

CUSTOMER RELATIONSHIPS:

In partnering Skanska, together with the client, design and calculate the price for the building/project in full transparency throughout the project.

CUSTOMER SEGMENT:

The clients are usually property owners, municipalities, government etc.

ACTIVITIES AND CAPABILITIES:

Skanska has a defined partnering process called "The first 100 days". During the first 100 days, Skanska intensively work to build the team and to understand client expectations. In short, Skanska partnering is based on:

- Setting collective goals for the entire team
- A concerted and transparent economy

The project is divided in two phases: *Phase 1*: The project is designed and calculated together with the client. *Phase 2*: If the client is happy with the design and price, construction works starts.

REVENUES:

In a partnering project, all costs are accounted for and presented the client. Within the contract. Skanska has a predefined profit which is added to all costs as a percentages of the contract sum.

COSTS:

Superstructure, HVAC and PVs are the largest cost in Kronodal. Over 1 300 m² of photovoltaics made sure that the total energy for heating, hot water, operational electricity etc was covered by the solar energy onsite. The total extra costs for reaching Deep Green and NetZEB was 6 % of the contract sum.

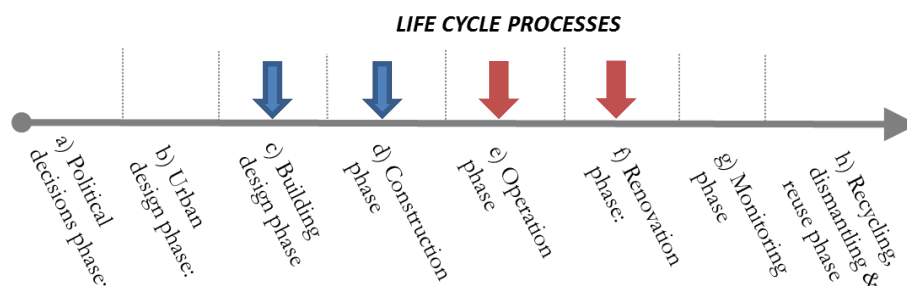
STRENGTHS AND KEY FACTORS:

- ✚ Prefab buildings for faster construction
- ✚ Partnering
- ✚ A trusting client, interested in green solutions.

MATURITY:

Skanska has 15 years of partnering experience. Kronodal was Skanska's fifth Deep Green project, and experienced specialists helped the project to set and fulfill the goals.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 46: CONSTRUCTION COMPANY: BOKLOK

Website: <https://www.boklok.se/>

VALUE PROPOSITION:

With the BoKlok houses you get quality accommodation for a very competitive price. A single parent with one child should afford to buy and live in a BoKlok dwelling. The BoKlok offer is attractive to many as the two companies behind are well-known and popular: IKEA and Skanska.

Lately the Boklok offer has changed, from being just affordable and good-enough in energy efficiency, to achieving 35 % lower energy requirements compared to the national code, while still maintaining the affordable offer.

CUSTOMER RELATIONSHIPS:

Ongoing residential projects are displayed on the BoKlok website and in IKEA stores. All who are interested are invited to a sales meeting where a lottery determines who is given the opportunity to buy a home.

CUSTOMER SEGMENT:

The offer is directed to anyone, but it is especially suitable for young families or couples, or couples who want to move from a big villa etc. The apartments are area-efficient and not addressing those who want volume and luxury surface materials etc. On the other hand, more focus than normal is put on the outdoor environment, with barbeque places, greenery, small plots for cultivating etc.

ACTIVITIES AND CAPABILITIES:

The houses are prefabricated in factories owned by BoKlok, and the design is not changed very often. The production is continuously reviewed to identify possible improvements. Almost all actors involved are inhouse – the business developer, the market people, the architect, the design consultants, the energy and sustainability experts, the

factory staff, the builders on site (Skanska) the suppliers of indoor material, (IKEA). Recently, BoKlok has started initiatives to offer even greener apartments, and has made the decision to install PV-panels on all BoKlok-dwellings from 2019. They have also built a BoKlok neighbourhood that is a Net Zero Energy building, and fulfils the rest of Skanska's requirements for "Deep Green", the toughest level in Skanska's environmental classification of housing projects. The combination makes up for a very cost-efficient NetZEB concept that might be produced in large volume the coming years.

REVENUES:

The dwellings are normally sold before they are built, creating a positive cash flow and good business.

COSTS:

The company produces their prefab modules (including ventilation, plumbing etc.) itself, and thereby they have good control of all costs.

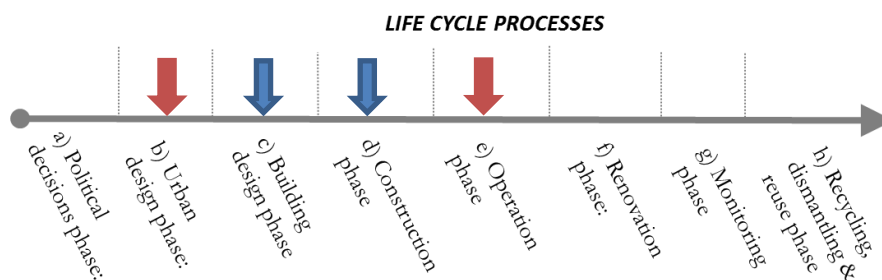
STRENGTHS AND KEY FACTORS:

- ✚ Repetition; industrialized and lean thinking creating cost-efficient buildings.
- ✚ No deviation from the concept/design
- ✚ Own production of complete prefab modules
- ✚ Financial service and indoor design choices like kitchen styles offered together with IKEA; taking advantage of IKEA's competitive prices

MATURITY:

The BoKlok concept started 1997 and BoKlok is currently building more than 1000 dwellings per year.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 47: RUBNER HAUS

Website: haus.rubner.com

VALUE PROPOSITION:

The company offers different wood houses with high ecological and energetic standards. The realization of the houses covers the individual requirements of each customer and is adapted to the climate zone. They provide three expansion stages: the shell of the house, turnkey solutions and turnkey solutions with basement.

CUSTOMER RELATIONSHIPS:

The company has a direct purchasing relationship to the customer. An after sales service is offered. Informative events take place at the so called Rubner Centre where consultation programs are provided. Further a personal consultation is within the portfolio.

CUSTOMER SEGMENT:

The offer is suitable to families or building owners who attach value to sustainable housing and are interested in individually planned and realized single-family houses.

ACTIVITIES AND CAPABILITIES:

Defined activities and capabilities are product marketing, product development, installation, cus-

tomers information, customer service and the selection of key partners.

REVENUES:

Für den Verkauf (gemäß Auftrag, Ausbaustufen und Bemusterung)

Revenues are made through the sale in accordance to the order and the several expansion stages.

COSTS:

The largest expenditures are qualified personnel, planning, pre-fabrication and installation.

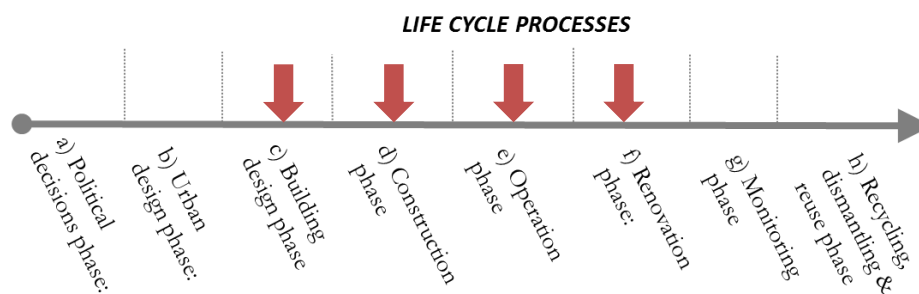
STRENGTHS AND KEY FACTORS:

- ✚ Automated 3D planning
- ✚ Pre-fabrication
- ✚ Rubner value-chain from the tree to the house
- ✚ High-value products and construction
- ✚ Rubner Centre as information centre
- ✚ Durability

MATURITY:

With more than 60 years of experience within wooden buildings there is a high maturity level.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 48: DIGITAL BOILER - STIMERGY

Website: <https://stimergy.com/en/>

VALUE PROPOSITION:

The company offers a new solution to harvest fatal energy coming from data centers directly into your building. This solution allows the production of hot water by offsetting the carbon footprint of this process. The cost of energy will be reduced comparing to heat produced by gas or fuel. A compact or modular types of installation of digital boilers are available depending on the required heat production. A warranty will be provided to produce heat on a yearly basis. These integrated servers warm the buildings' water all year round. As a result, a coverage up to 60% of the hot sanitary water needs.

CUSTOMER RELATIONSHIPS:

The company developed a business to business strategy, where they specified with consultancies firms performances and technical solutions for the implementation of their innovative product. They have also a direct client relationship through their monitoring and maintenance offer.

CUSTOMER SEGMENT:

The offer is dedicated for various type of customers with high hot water consumption rate. Several types of heat recovery are developed depending on the application; for example: collective residential houses, sports facilities, swimming pools and hotels with high hot water demand.

ACTIVITIES AND CAPABILITIES:

Stimergy perfectly organizes with the data center deployment a match for calculation capacity requirements and cooling associated activities (distributed data centers).

The company speeds up its development in France before going international. In an urban environment, Stimergy works with housing buildings of at least 20 apartments, or buildings that welcome the

public, like swimming pools, hotels...

Stimergy finds an echo in smart cities, where the territory's stakeholders and the companies embrace an innovative and voluntarist approach to change their ways of consuming and recycling energy while having a high requirement level about the computing power they need for their growth.

REVENUES:

Revenues of the company will be made firstly by selling the digital boiler as a CAPEX investment, secondly by selling the digital boiler under Power Purchase Agreement (PPA) contract and finally by supervision and maintenance contracts which are proposed for clients. Another revenue stream comes from data center's owners who will rent computational and calculation capacities.

ACTIVITIES AND CAPABILITIES:

The digital boiler consists of several integrated small data centers. Main costs will be the different parts of the boiler, the electrical connection and consumption and some administrative & R&D.

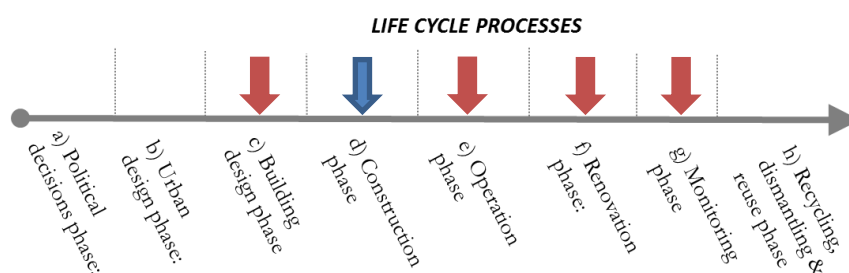
STRENGTHS AND KEY FACTORS:

- ✚ Energy saving up to 60% on hot water
- ✚ Warranty of the performance during the whole life of the system
- ✚ Most competitive renewable energy
- ✚ Constant renewable energy production
- ✚ No variation of energy cost

MATURITY:

Stimergy has been developing its distributed data centers since 2013. Currently, more than 20 buildings representing 500 dwellings are equipped with data boilers. Stimergy is developing their consultancy to identify the various credits and taxes subsidies which will help to develop further the business.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 49: INDIVIDUAL SELF CONSUMPTION - ENEDIS

Website: <https://www.enedis.fr/english>

VALUE PROPOSITION:

The grid supplier “Enedis” and the energy producer “EDF” will offer the possibility to consume the produced renewable energy onsite. The private energy producer has two options: the first one is the auto-consumption of the whole energy produced without re-injection on the electrical grid. On the other hand, the second choice is to self-consume only a part of the produced renewable energy and re-inject the remaining part.

CUSTOMER RELATIONSHIPS:

The association of these two companies developed a business to customer strategy, where they provide the connection services to the existing grid and the billing system to buy the produced energy and encourage PV installation by offering incentives. Enedis is also in charge to manage the relationship between customer and energy producer “EDF”. EDF buy the energy produced on a 20 years basis contract.

CUSTOMER SEGMENT:

The offer is dedicated for all type of building. It depends on the capacity of the photovoltaic with various threshold.

ACTIVITIES AND CAPABILITIES:

Enedis manages the public electricity distribution network for 95% of continental France. Every day, its 38,507 employees oversee the operation,

maintenance and development of a nearly 1.3 million km network.

Enedis carries out the grid connections, the maintenance, the metering and all the technical intervention.

REVENUES:

Since Enedis is a public company, so its revenues are defined by the French government.

COSTS:

Dedicated cost are related to maintenance, supervision, extension and renovation of the grid.

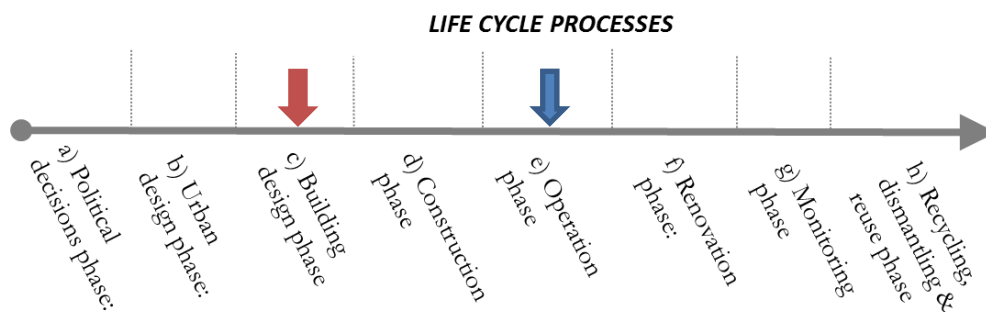
STRENGTHS AND KEY FACTORS:

- ✚ Source of revenues for the non-consumed part of the produced energy
- ✚ A simplified relationship between Enedis/EDF and customer due to a smart meter “Linky”
- ✚ Encourage energy saving with money reward
- ✚ Decentralized energy production and distribution (no line losses)
- ✚ Low variation of energy cost (mainly taxes: TURPE)

MATURITY:

This new business model was launched recently (2017). 20,000 apartments have selected the individual auto-consumption contract. For non-residential, the percentage is very low.

PLACEMENT ALONG VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 50: COLLECTIVE SELF CONSUMPTION - SUNCHAIN

Website: <https://www.sunchain.fr/en>

VALUE PROPOSITION:

Based on blockchain & IoT technologies, Sunchain's solution manages the energy exchanges within local energy communities, gathering producers, consumers and prosumers.

This solution promotes local green energy cooperative projects by providing a solution that optimizes self-consumption rates and lowers electricity bills.

Power production and consumption data are encrypted, signed and recorded in the blockchain directly from the smart meters. The energy allocation between all involved participants is securely processed and certified.

VALUE PROPOSITION:

The company developed a business to business strategy, where they contract with firms, local authorities and communities for the implementation of their innovative products and solutions.

CUSTOMER SEGMENT:

The offer is dedicated for various type of customers: social and private landlords and communities, as well as local authorities and can be implemented for a single building or for a whole district.

ACTIVITIES AND CAPABILITIES:

Regarding blockchain applications to the energy sector, Sunchain has been a leader. The company developed its own blockchain specifically designed for small energy exchanges.

It's a consortium blockchain, using no mining process, that benefits from a very low electricity consumption. This 'tokenless' blockchain, not

linked to cryptocurrency, meets trust and scalability requirements.

Sunchain also develops its own IoT modules that are plugged on smart meters and collect electrical data. A web app enables users to follow their energy consumption, from the traditional retailer and from the local solar plants.

REVENUES:

Revenues of the company are made firstly by selling the IoT module and by implementing the solution as a CAPEX investment. Secondly, service operation and maintenance are assured.

COSTS:

Costs are R&D expenses, mainly composed by internal workforce. Along with that, electronic components supply, IoT modules manufacture, and cloud service build company's global costs.

STRENGTHS AND KEY FACTORS:

The main strengths are as follow:

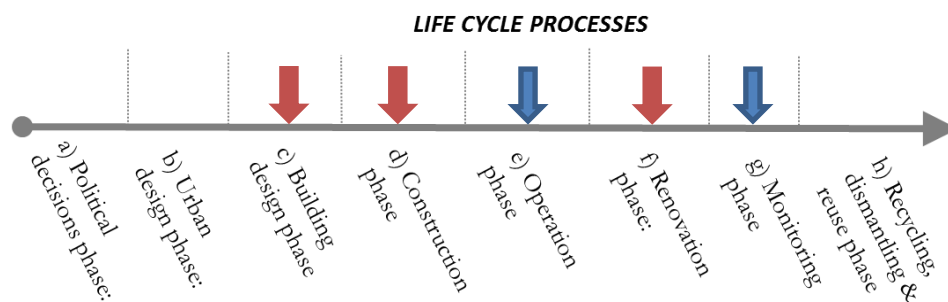
- ◆ Collective self-consumption management
- ◆ Electricity bills reduction,
- ◆ Dynamic sharing of energy,
- ◆ Near real-time visualization via a web app,
- ◆ Trust in data, security and certification

MATURITY:

Sunchain has been developing its solution since 2016. Currently, this solution is implemented on two 30 kWc collective PV projects: in a social housing building and in a small district of 7 building, representing 30 users.

In 2019, 4 projects would be set up with a total power of 425 kWc PV.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 51: FACILITY MANAGEMENT - PRODUCT-SERVICE SYSTEMS

VALUE PROPOSITION:

In this Business Model the producer remains the owner of the product. This fact encourages him, to design the product in such a way, that it is easy to repair and has a maximum residual value. The result is that optimum use is made of products components and raw materials, and users are better served.

CUSTOMER RELATIONSHIPS:

The provider has a contractual relationship about the service to be delivered (e.g.: light on the workplace). The building owner is usually not the owner of the product but only benefits from the service. Due to this business model, manufacturers do not have a short-term relationship with the customer (sale of the product) but have a long-term relationship due to the contractually assured performance of services.

CUSTOMER SEGMENT:

The offer is aimed at building owners who always want to have a functioning building without having to resort to external services (not from the manufacturer).

ACTIVITIES AND CAPABILITIES:

The manufacturer can offer a better service for the longevity and functionality of the products as he determines the exact construction himself. The manufacturer has full documentation of the product, which makes it easy to maintain and service the product.

REVENUES:

Predictable cash flow due to constant flow of lease payments (income at regular intervals).

COSTS:

Companies offering product-service systems are increasingly obtaining finance and this is becoming more straightforward. Lease constructions or principles originating in project financing are used.

Costs for:

- Producing the product
- Product maintenance and repair
- Product disposal

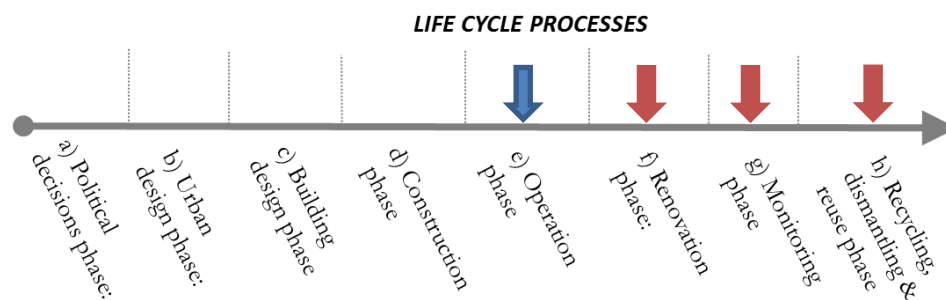
STRENGTHS AND KEY FACTORS:

- ✚ Perfect service for users
- ✚ Smarter use of the product due to better designs, maintenance and reuse
- ✚ More information on the materials and the product because the product returns to the producer

MATURITY:

The Construction & Real Estate sector is already experimenting a great deal with product-service systems, for high-tech products such as lights, lifts and photocopiers, but also for carpets, inventory and even entire buildings. This trend can also be seen in other sectors, such as the automotive, ICT and textile industries.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 52: MANUFACTURER - LIFETIME EXTENSION

VALUE PROPOSITION:

The user is offered an increased value of a product based on an integrated long-term view. The manufacturer does not focus on the cost-oriented demand side but develops strategies to extend the service life, thereby creating long-term value.

CUSTOMER RELATIONSHIPS:

The provider has a contractual relationship about the service to be delivered (e.g.: light on the workplace). The building owner is usually not the owner of the product but only benefits from the service. Due to this business model, manufacturers do not have a short-term relationship with the customer (sale of the product) but have a long-term relationship due to the contractually assured performance of services.

CUSTOMER SEGMENT:

The offer is aimed at building owners who have a building with a high long-term value.

ACTIVITIES AND CAPABILITIES:

By monitoring the products with IoT and Big Data, costs can be saved for the user and manufacturer, and maintenance can be planned intelligently. Lifetime optimization gives the customer a cost advantage and a better product, while the manufacturer can learn more about the phase the product is in use.

REVENUES:

Maintenance provides opportunities to minimize costs. Thanks to data collection, more and more is known about the properties of the materials and the products, and about how users handle the products. Refurbishment and remanufacturing let a manufacturer improve and upgrade products based on information about their use and performance.

If buildings are constructed flexibly and adaptively to simplify maintenance, renovation or a change of function, this will benefit the financing.

COSTS:

Manufacturers can get higher prices for a product because it has a longer life and can be easily maintained throughout its lifecycle. To prove this cost-effectiveness, the life cycle costs must be considered during the planning process.

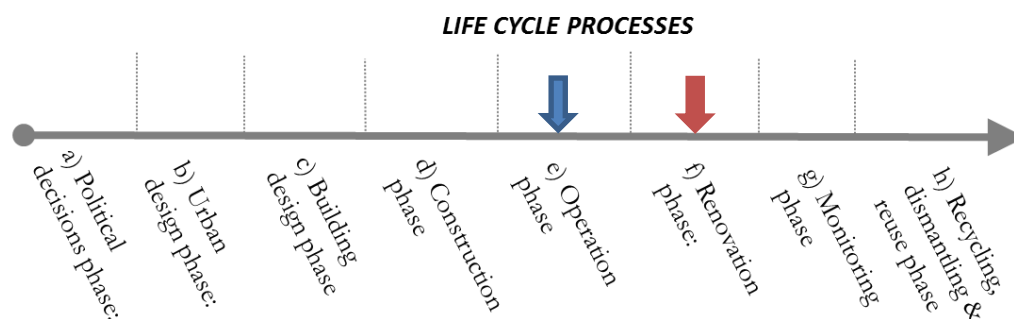
STRENGTHS AND KEY FACTORS:

- ✚ Better data basis on the behaviour of the products in the usage phase
- ✚ High value retention for the user
- ✚ Consideration of the residual value of a product at the end of its life

MATURITY:

Because of the shift towards leasing services in the construction industry, the focus is shifting to the consideration of the service life of products.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 53: DECONSTRUCTION COMPANY - VALUE RECOVERY

VALUE PROPOSITION:

The consideration of the residual value of a building structure makes it possible for the owner to include not only the value of the property and the rental income to be generated for a profitability analysis, but also the material value at the end of life.

Through this view of a WLC assessment, revenues can be generated by the demolished materials. At the same time, the idea of recycling is promoted, and the environment is protected by the reduced consumption of primary resources.

CUSTOMER RELATIONSHIPS:

By taking back the products, the manufacturer can bind the users to him in the long term.

CUSTOMER SEGMENT:

The offer is aimed at building owners who always want to have a functioning building without having to resort to external services (not from the manufacturer) and also to manufacturers who are interested in returning the products they install to their production chain at the end of their life cycle.

ACTIVITIES AND CAPABILITIES:

There are currently numerous initiatives that enable high-quality recycling ("upcycling"), a core component of the circular-flow economy. However, these solutions are often very innovative and require the use of new (almost untested) technologies.

REVENUES:

- Residual value of products that will be sufficient to start a new construction cycle
- Being prepared for a shortage of raw materials. New policy/regulations to meet the objectives of the government-wide programmed
- Lower transport costs (use what is already there, if possible on site)
- No costs for waste removal; instead, revenue for new raw materials

COSTS:

At the beginning of a product cycle, industry partners and owners must consider higher investment costs, which justifies lower operating costs and a higher final value of the components.

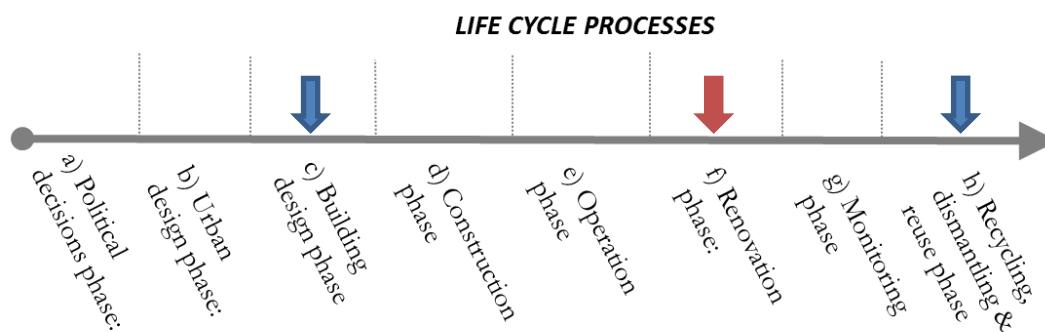
STRENGTHS AND KEY FACTORS:

- ✚ Reduction of environmental impact for the extraction of primary raw materials
- ✚ Determining the residual value of a property
- ✚ Development of high-quality recycling processes

MATURITY:

The solutions are often very innovative and require the use of new (almost untested) technologies.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 54: CONSULTANT COMPANY - ENERGY SAVING CALCULATION AND CONSULTANT

Website: <http://www.enev-aktuell.de/index.html>

VALUE PROPOSITION:

As a service provider, the company offers the energy calculations required in Germany for new buildings and serious renovation activities in order to prove the Heat Insulation Ordinance (EnEV). As an accredited engineering office, the calculations and design descriptions for higher-quality energy standards and therefor higher subsidies (KfW 40+, 40, 55) are possible. The customer can use the construction supervision and final acceptance. This benefit is subsidized by KfW Bank. Through the detailed thermal bridge calculation and a recognized calculation model, the required standards are achieved with less material (and thus less financial) effort.

CUSTOMER RELATIONSHIPS:

As an established consulting service provider, the company has developed its reputation over the years. As a listed contact of KfW Bank, it is named on the homepage as a regional consultant. Web site and lectures in professional circles are added.

CUSTOMER SEGMENT:

Due to the fact that all building activities and thus all clients are affected by the presentation of the heat protection calculation (EnEV), the customer segment is highly diversified. Architects and customers which emphasize on sustainable and energy efficient buildings are main customers.

ACTIVITIES AND CAPABILITIES:

The service portfolio includes providing the necessary information for customers, consultancy, intermediation of architects, construction and its supervision as well as optional financing subsidies by the KfW-Bank, renovation and customer support. Additionally, the company benefits from

REVENUES:

Revenues are made depending on the relevant contracts made with the client and the remuneration of consultancy work by KfW Bank.

COSTS:

General administrative costs

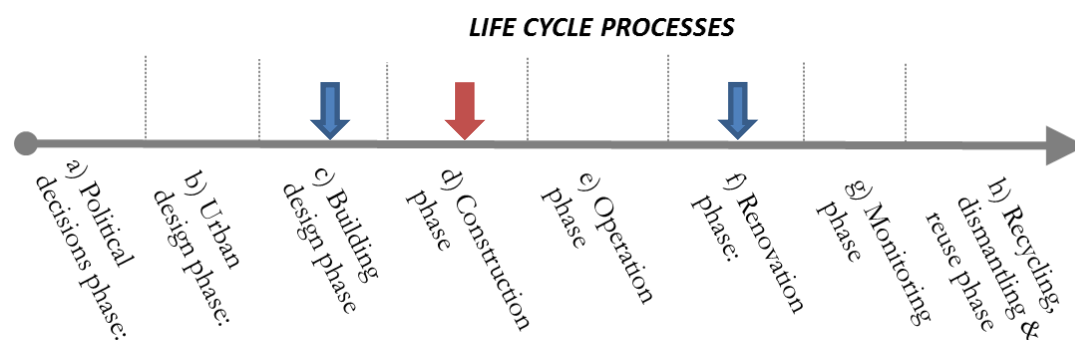
STRENGTHS AND KEY FACTORS:

- ✚ individual customers consultancy
- ✚ own certified software
- ✚ Construction supervision from the planning phase to final acceptance

MATURITY:

The company has many years of experience in its field of work. Due to the detailed calculation of the building parts and thermal bridges, they generally achieve better values than generated in standard programs.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 55: RENEWABLE ENERGY SYSTEMS: CHP- PLANTS (COMBINED HEAT AND POWER PLANT)

Website: <https://www.senertec.de/die-dachs-familie/>

VALUE PROPOSITION:

The company offers CHP plants for maximum energy efficiency. For all products subsidy from national providers (e.g. KfW-Bank) are available. Through the production of electricity and the feed in the public grid the customer has an additional income. The waste heat is used for heating and DHW. Additional services such as the integration of photovoltaic systems in a superior energy concept and accounting models with the energy-supplier are also available.

CUSTOMER RELATIONSHIPS:

In order to get in touch with customers the company provides brochures, a detailed website with the possibility to get in contact with a regional personal consultant. References of different projects in all sizes are shown on the web site. The company offers the whole process of engineering, production, installation and maintenance during the whole life cycle of their products. Several offices overall in Germany proposes a timely service. Personal assistance, a customer service reachable via telephone hotline as well as internet and the offer of maintenance services helps building a long-term customer relationship.

CUSTOMER SEGMENT:

The offer is widely spread from single family homes, apartment buildings and quarter solutions to industry clients. Several possibilities, services and configurations are available

ACTIVITIES AND CAPABILITIES:

The service portfolio includes providing the necessary information for customers, consultancy, renovation and customer support. Additionally, the company benefits from having their own production sites for the main building parts.

REVENUES:

Revenues are made depending on the sold technical equipment and maintenances services. The company offers various contract models.

COSTS:

The company manufactures the major system components itself. General operating costs

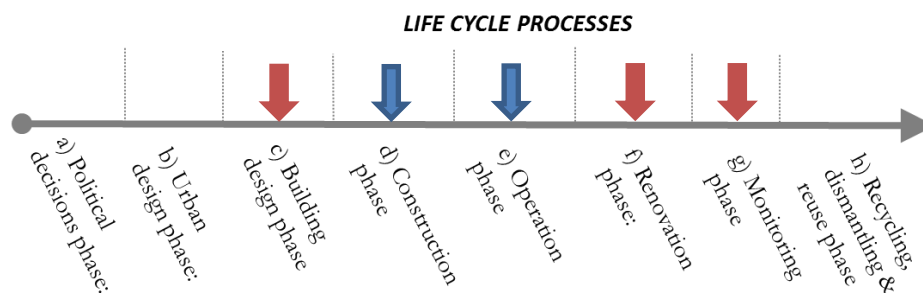
STRENGTHS AND KEY FACTORS:

- ✚ own fabrication of major system elements
- ✚ continuously improvement of the products using technical data from former models
- ✚ Differentiated offers to the customer's needs and additional offers and services through the company partners

MATURITY:

The company has a long experience in their working field. They installed und maintained more than 36.000 plants. A continuous flow of product information, during the whole LC-process, makes a regular improvement of the products understandable.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 56: DATABASED ONLINE SEARCH FOR FUNDING OPPORTUNITIES, SERVICE PROVIDER FOR THE COMPLETE APPLICATION AND SETTLEMENT PROCESS

Website: <http://foerderdata.de/>

VALUE PROPOSITION:

The company provides access to almost all grant programs available nationally, regionally or from local energy providers in Germany. A continuously updated and extended database offers an overview and search functions on approximately 6000 funding programs in the field of energetic construction and heating renovation as well as in the construction or purchase of new buildings or apartments. As a service provider, the company offers for a fee, the search for the best funding opportunities and the complete application and settlement process.

CUSTOMER RELATIONSHIPS:

In order to get in touch with customers the company provides a detailed website. The customer is directed to the corresponding funding programs via an input mask in which the individual details of the desired funding object can be entered. Here he can decide whether he wants to personally contact the respective funding institution or whether he wants to pay and entrust the company with the handling of all formalities.

CUSTOMER SEGMENT:

The offer is wide spread. The platform can be used as a search engine by all customers (private and public investors) interested in new construction or purchase of single-family homes, flats or apartment buildings, renovation of heating systems, energetic refurbishment of buildings etc. The main focus is on supporting the search for tailor-made funding offers for the respective project mostly on sustainable and energy efficient systems, buildings and products.

ACTIVITIES AND CAPABILITIES:

The portfolio includes a quick and comprehensive overview of existing promotional and loan offerings, which extend to offers from regional energy suppliers. With the possibility to award the whole process of finding the best deals, mediation of a local energy consultant, who accompanied the whole grant and loan applications in the complete planning and construction work, up to the contract management by the company, the customer benefits from the knowledge and the experience. By commissioning the customer receives the security of the professional processing of his request.

REVENUES:

The use of the platform is primarily free. The revenues for the company arise from the contracts when customers use the takes over of the company for the search for appropriate funding offers and the complete processing with the funding institutions.

COSTS:

General administration costs.

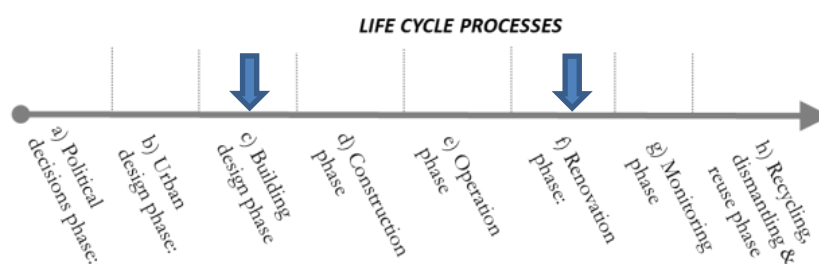
STRENGTHS AND KEY FACTORS:

- ✚ constantly updated and extended overview of almost all available funding programs/wholesaler for most parts
- ✚ professional processing through the whole process
- ✚ Accompanied by a consultant possible

MATURITY:

The company has a meanwhile 20 years history and can proof its possibilities. It is shown that the company had promoted about 15.000 heating systems.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 57: ENGINEERING COMPANY: CONSULTANCY

Website: <https://www.3isrl.it/>

VALUE PROPOSITION:

The company offers integrated engineering, planning, consultancy and training services. Their strong point is multidisciplinary of competences and an effective integration of different skills of the team. Some of services offered by the company are: structural and facilities planning, energy efficiency, fire safety, safety of building sites, customer training and management systems.

CUSTOMER RELATIONSHIPS:

In order to get in touch with customers the company provides digital brochures and a detailed website, participates at conferences and organizes events, for example related to energy such as science fair for schools. References of previous projects and all services offered by the company are shown on the website. For a consultancy the customer can get in touch with the company going directly to their office, by email, social networks or by phone.

CUSTOMER SEGMENT:

The offer is directed at every kind of customer: residential, industrial, public sector and private individuals. There are solutions tailor made for all customers and all different needs.

ACTIVITIES AND CAPABILITIES:

The company offers consultancy for a wide variety of businesses and facilities. It provides solutions for the planning, construction and follow-up phase of a building as well as renovation, customer support and optional financing services. The office of energy improves efficiency, savings, reduces costs for the client's company and submits the applica-

tions for access to the incentives. Moreover, the company provides certifications of management systems and planning of fire safety engineering. Finally, they spread their knowledge and experience through effective trainings.

REVENUES:

Revenues are made depending on the relevant contract. The company offers customer made services in residential markets with small building but also in industrial and construction markets, with different revenues. Costs depend on the customers' wishes and on the complexity of the project and of the system.

COSTS:

The company offers consulting services, so the main cost is represented by personnel expenditures for the planning, construction, processes analysis and customer support.

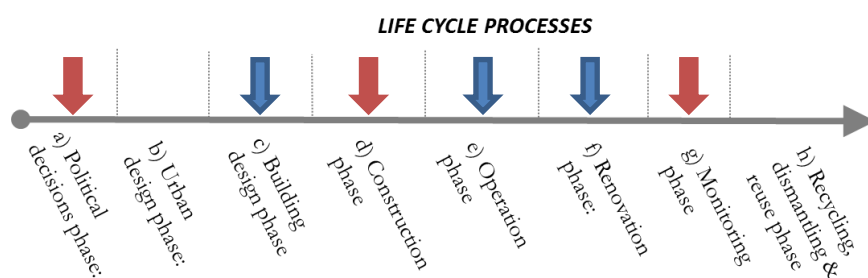
STRENGTHS AND KEY FACTORS:

- ✚ Services for all customer segments;
- ✚ Immediate energy savings and green contribution;
- ✚ Continuous skills' updating and field experience;
- ✚ Customer loyalty;

MATURITY:

The company has a long consultancy history and can provide clients with technical data from older projects. These data improve their experience and can be used with future clients.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 58: EURAC INSTITUTE FOR RENEWABLE ENERGY

VALUE PROPOSITION:

Develop knowledge and innovation in the field of renewable energy and energy efficiency

- (Coordinated) publicly funded research projects
- Third party funded research (industry)
- Commissioned R&D projects
- Technical consultancies
- Testing campaigns for complex building products and energy systems
- Networking with main market player associations (e.g. technical working groups)

The institute leverages on the relevant technical experience acquired in research projects to propose clients the most innovative technical approaches, both in product and method development.

CUSTOMER RELATIONSHIPS:

Research projects.

CUSTOMER SEGMENT:

Building components producers, engineering design firms, designers, contractors, public institutions and real estate asset developers/owners.

ACTIVITIES AND CAPABILITIES:

R&D, technical consultancy, modelling, prototyping, laboratory testing, definition of business cases.

REVENUES:

Revenues are generated by coordinated and non-coordinated research projects (public funding) and by the execution of industry cooperation projects, as well as technical consultancy and laboratory testing.

COSTS:

Staff costs, infrastructure cost, laboratory materials and staff costs, marketing costs, communication costs, commercial activity costs (e.g. participation in construction sector, energy fairs).

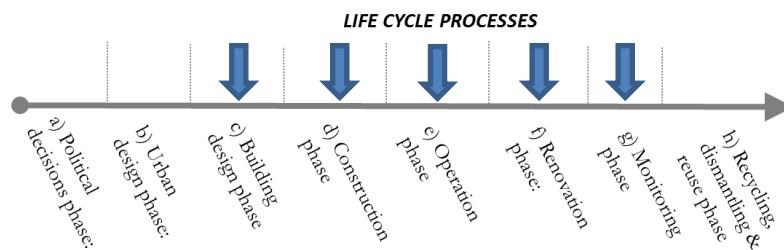
STRENGTHS AND KEY FACTORS:

- ✚ Key player in innovation in the field of Renewable Energy and Energy Efficiency
- ✚ Able to manage complexity in technical and process issues
- ✚ Clear technical content, high specialization and multidisciplinary are an asset to the clients
- ✚ Several research staff members are associate to relevant professional networks
- ✚ Several research staff share the same set of tools, so there is a critical mass expertise in the field of energy efficiency and simulation

MATURITY:

EURAC research started its research activity in 1992, the Institute for Renewable Energy initiated later on in 2005, but is nowadays a reference player and trend-setter in many research areas related to Energy Efficiency in Building and Systems, integration of Renewable Energy Systems also in infrastructure and industrial processes.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 59: NON-PROFIT

Website: <https://living-future.org/>

VALUE PROPOSITION:

Nonprofit working to build an ecologically-minded, restorative world for all people. Using principles of social and environmental justice, seeks to counter climate change by pushing for an urban environment free of fossil fuels. It runs several rigorous programs addressing buildings, communities and companies' performances under sustainability, social equity, justice and transparency perspectives. These programs develop a green framework for living in a 21st-century world. The goal is to establish worldwide vibrant communities that are socially just, culturally rich and ecologically restorative.

CUSTOMER RELATIONSHIPS:

The nonprofit gets in touch with people providing many resources and with different means: website, downloadable materials, including technical guides, templates and research reports, books, at least bi-weekly newsletters, social media, on-line platform and technical support available for project teams, education programs, three annual flagship conferences, events and workshops worldwide, also through the work of tireless local communities of trained volunteers and in collaboration with partner organizations and manufacturers.

CUSTOMER SEGMENT:

Target customers are professionals (architects, engineers, sustainability consultants), private and public owners for residential, commercial, buildings for communities, municipalities, developers, manufacturers and companies.

ACTIVITIES AND CAPABILITIES:

The nonprofit has many initiatives, including programs focused on sustainability at a building, community and products scale, zero energy, zero carbon and transparency labels for products, companies and building energy performance. Moreover, it is the publisher of a blog, and produces books with beautiful case studies and technical guidance on the topic of regenerative design.

REVENUES:

Revenues come from different channels: individual donations, annual memberships, sponsors, foundations, donation of goods and services, government grants, fees for registration, audit and certification of projects and labels.

COSTS:

Costs are mainly related to personnel costs, services and materials related to the organization and management of the different activities and events.

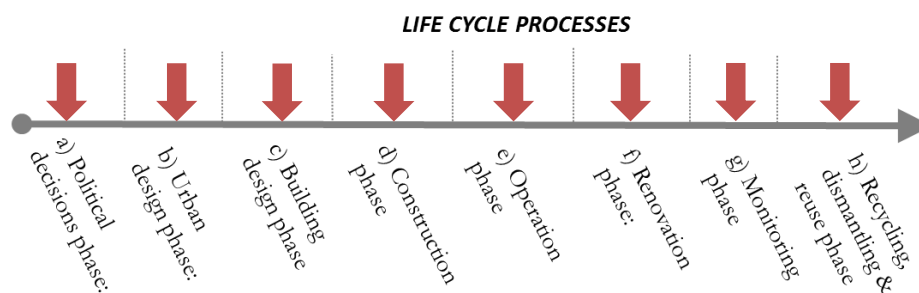
STRENGTHS AND KEY FACTORS:

- ✚ Help communities to create a future that is socially just, culturally rich, and ecologically restorative.
- ✚ Development of the most advanced and rigorous sustainability programs and labels for the built environment.
- ✚ Valuable tools and resources for professionals, companies, manufacturers.
- ✚ Advocacy and impact in transforming policies.

MATURITY:

The nonprofit celebrates 10 years of activity, with 500+ registered projects, 1000+ trained volunteers distributed in 125 communities in 70 nations.

PLACEMENT ALONG THE VALUE CHAIN OF NZEBs



Placement of nZEB business models along the value chain

BM 60: AEE INTEC: NZEB - PROOF OF CONCEPT RESEARCH

Website: <https://www.aee-intec.at/data-monitoring-and-testing-pk14>

VALUE PROPOSITION:

Housing associations or public real estate companies do not have the knowledge of how to put NZEB into practice. That means they are dependent on specified technical offices who translate technical regulation and state of the art to their specific building project's needs.

Some of the housing associations or real estate developers want to prove their awarding practice with the technical offices but also prove the implemented energy and evaluate NZEB concepts by involving research organisations.

AEE INTEC has now around 20 years of experience in “proof of concept” evaluation and carries out accompanying investigations in different buildings for different clients like regional government of Styria.

CUSTOMER RELATIONSHIPS:

The personal contacts of single employees of AEE INTEC to the public regional and national administration, but also to housing associations or private building owners, via research activities are the most important reason. The proof of concept research is not actively advertised.

CUSTOMER SEGMENT:

The research is directed at real estate developers or facility managing companies, housing associations and public building owners, who pay for the evaluation of new technologies or concepts for NZEB. The clients of course have strong commitment to independent investigation.

ACTIVITIES AND CAPABILITIES:

AEE INTEC offers technological review with desk work for technology background information, planning of measurements and monitoring con-

cept. For this, AEE INTEC offers measuring equipment, laboratory facilities, simulation and calculation tools.

The institute has its own “Data monitoring and testing” department and experts on simulation tools and data evaluation.

REVENUES:

Revenues come from the contracting authority / the client as fixed rate. Sometimes the monitoring project can be co-financed by and used as demonstration or evaluation case study in another research project.

COSTS:

The costs are composed of wages for the experienced staff, office equipment and costs for measurement and calculation hard- and software. Of course there are also costs for staff trainings on technologies and social skills.

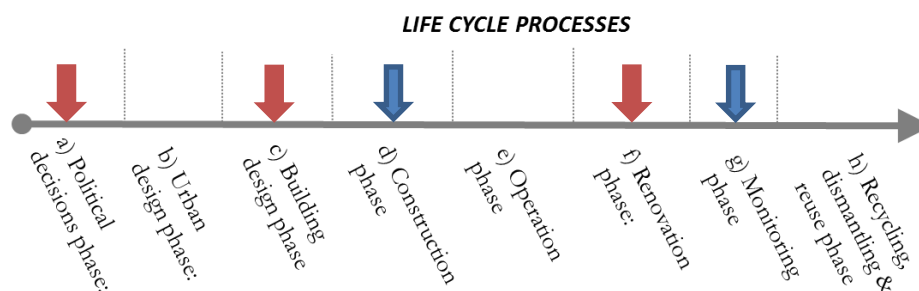
STRENGTHS AND KEY FACTORS:

- ✚ All in one know-how for evaluation of NZEB concepts / technologies
- ✚ Independent and advanced proof of concept by experts
- ✚ High potential of regular engagements in this field

MATURITY:

AEE INTEC is one of the first addresses in Austria when it comes to evaluation and research on new energy related technologies for buildings and thermal energy networks.

PLACEMENT ALONG THE VALUE CHAIN OF NZEB



Placement of nZEB business models along the value chain