Analysis and Cross-Comparison of Business Models for nearly Zero-Energy Buildings in Europe

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Abstract. Nearly Zero-Energy Buildings (nZEBs) will be the standard for new constructions in Europe from 2019 (public buildings) and 2021 (private buildings). Even though several technologies for realizing nZEBs are already available, their market penetration in Europe is still low. This can be ascribed to both high initial investment for nZEBs and limited adequate business models for several stakeholders along the buildings’ lifecycle. The aim of this paper is to present and analyse examples of existing business models for nZEBs in different European countries. A broad overview of these business models, accompanied by evidence of their key factors and strengths is essential for developing new business models that ensure a cost-optimal nZEB implementation and adequate profitability for all stakeholders involved. Therefore, at first business models of different European markets and nZEB lifecycle phases are searched for and described in a profile-like manner. Secondly, the key factors and strengths of each business model are pointed out. In the end, a cross-comparison of the business models is done according to some key parameters, such as involved stakeholders and covered life cycle phases. This knowledge serves as a basis for the development of innovative nZEB business models. The work presented in this paper is developed in the frame of EU funded project CRAVEzero – Cost Reduction and market Acceleration for Viable nearly zero-Energy buildings which is co-funded by the Intelligent Energy Europe Programme within the Horizon 2020 Framework Programme of the European Union.

1. Introduction and Objective

1.1. Introduction
High investment costs and the lack of business models that are both reliable and economically viable for companies have been identified to be among of the main obstacles to nearly Zero-Energy Building’s market-uptake [1]. Thus, in order to allow for the nZEB market acceleration needed to ensure Europe decarbonization objectives, 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, CRAVEzero project partners contributed with descriptions of both their own and additional business models found on the internet. Additional business models were retrieved through interviews with companies not directly involved with the project. A comparative analysis of the findings is conducted in order to evaluate whether there are patterns according to different stakeholder perspectives that indicate success potential. Different stakeholder perspectives analyzed 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 results generated with the analysis, main features useful to attract customer and strategic partnerships to create efficient win-win-situations emerge clearly, as well as phases along nZEBs’ life cycle that are still lacking appropriate business models. This knowledge then serves as a basis for profiling new business models focused on nZEBs.

1.2. 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 modeling has not reached sophisticated maturity in many companies, especially in the construction sector. As a matter of fact, a number of companies developed certain business ideas and sections that work successfully. However, they often have not defined a complete and exhaustive business model including all necessary parameters required to describe its functioning. 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, the objective of this paper is collecting and analyzing existing business models, an essential preparatory step for generating innovative business models.

2. Scope and Methodology
In order to describe existing nZEB business models, a standardized blank profile has been developed. It includes parameters described in Table 1. The parameters are mainly based on the deliberations of Osterwalder and Pigneur [2] and their so called business model Canvas.

| 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 at              |
| Activities and Capabilities| The most important activities a company needs to conduct in order to provide the offer and necessary resources required |
| Revenues                   | Type of streams a company generates revenues with                            |
| Costs                      | Most important expenditures that incur for the provision of the offer        |
| Maturity                   | Stage a company is situated in regard 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. |

This profile was used to describe all business models of companies in different European countries and other major European markets. Furthermore, the CRAVEzero-partners described their own business models. The descriptions of third party business models are based solely on information.
found on companies’ websites rather than insider knowledge. The work therefore does not claim to provide all information about the business models, nor it can be guaranteed that the information given online have been interpreted correctly. However, 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.

After collecting information on business models related to various phases along the nZEB life cycle, a comparative analysis was conducted. Repetitive patterns are highlighted and common strengths and key factors are identified. In the end, the key findings of the analysis are described.

3. Analyzed nZEB-Business Models

In a first step, 17 business models, provided by the project partners, have been analyzed in depth (see [3,4]). The business models are mostly performed by the companies directly benefitting from the project and have therefore been described based on first-hand information and experience. In addition to the 17 business models, more nZEB business models of the European markets were collected and described. In total, 60 business models with more than fifteen different stakeholder perspectives and for all stages in a building life-cycle were analyzed. The Business models cover several different stages of a building’s lifecycle as shown in Figure 1. Figure 1 also shows that there are stages in the life cycle with many business models available (e.g. Planning, Construction), and stages with only few models (e.g. Political Decision, Monitoring, Recycling/ Dismantling/ Reuse). Detailed descriptions of the analyzed business models can be found in [2].

The business models are categorized according to their stakeholder perspective as follows (the number of analyzed business models is given in brackets):
4. Results of the Business Model Analysis

Results described in the following are based on [2]. The paper presents only the most significant results in detail. However, in the discussion below, also additional results from the cross comparison of the analyzed business models within the CRAVEzero project are shortly summarized.

4.1. Value Proposition

The value proposition describes products and services offered to the market, how benefits for customers are created by relieving pain or creating gains, as well as supporting customers to manage and achieve a certain task. Figure 2 shows the value propositions offered within the collected business models in a comparative analysis. The most common features/values of the business models are green labels and sustainability; comfort and innovation, (energy) cost reductions and efficient energy performance. Furthermore, the focus on good quality customer services is essential for many analyzed BMs. All these features can be found in BMs of different stakeholder perspectives. Features like customization, the increase of a building’s residual value and products’ durability, as well as a focus on social responsibility within a company’s offer are less common and depend on the stakeholder offering the service/product, often very focused product manufacturers or service provider.

Figure 2: Comparative analysis - Value proposition

4.2. Strengths and Key Factors
The strengths and key factors identified in the analyzed BMs are summarized and compared in Figure 3. These factors contribute to the success of a business. The identification of these factors is important both for the enhancement of existing BMs and for the creation of new innovative ones.

Comparing the collected BM, patterns of common strengths and key factors become apparent. To simplify the analysis the business models are clustered according to different stakeholder perspectives. The most recurring strengths and success factors are: widespread competencies (all services in-house) as well as lock-in, which describes the ability of a company to create and maintain good customer relationships. Thereby the companies are able to convince customers to purchase, win their trust and create long term relationships. Know-how, innovation and sustainability as well as guaranteed prices/performances are also common strengths and key factors. More specific and less frequently mentioned is the capability of prefabrication, which allows faster building process, and supports the company’s image.

For General contractors, scalability (up/down scaling the resources depending on the project size) seems to be important, while real estate developers benefit from having influence on the (political) 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 cover the full range of services along the building’s life cycle, planners often focus their expertise on a specific and confined planning phase. Innovative planning tools and the capability of using them efficiently are important success factors for planning and design businesses. This includes know-how in the field and experienced and well trained employees. Besides the internal competencies, many nZEB BMs strongly depend on the collaboration of different partners and stakeholders.
4.3. Life Cycle Phases

The different nZEB life cycle phases covered by the collected BMs are shown and described in Figure 1. It becomes apparent, which phase still runs behind in terms of business models availability (e.g. Political Decision, Monitoring and Recycling/ Dismantling/ Reuse).

To get an overview of the different business models that evolve around nZEBs, the entire life cycle of a building needs to be analyzed. This includes the phases of political decision-making, urban planning, technical design, construction, operation, maintenance and renovation, as well as dismantling and recycling at life-cycle end. In each of these phases various stakeholders are involved in the buildings life cycle while trying to capture value with their business model. Within CRAVEzero 17 business models of project partners and additional 43 BMs of European markets have been
analyzed. Most BMs are in the planning and construction phases. Only one business model has been described for the political decision or monitoring phase. This latter can be a supplement to existing models or be done with partnerships (business model packages). The same could apply for BMs in the recycling/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 building, a nZEB and a CRAVEzero building (see Figure 1), 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, which allows to optimize the following phases. Due to careful study and detailed work during the planning and construction phase, it is possible to have some benefits: monitoring, operation, maintenance and renovation phases involve lower costs. In the CRAVEzero building the goal is to give even more importance to the planning phase leading to higher costs in early stages of the building’s life cycle. This additional effort, however, lowers the cost in the following stages. It leads to an improvement of the management of the building and the follow up costs such as energy consumption, operation and maintenance costs in all phases will be lower.

5. Discussion and Conclusion

The results of the comparative analysis are discussed and summarized in the following. Especially noticeable insights, saliences and special learnings are pointed out.

A comparative analysis based on the information of the business model profiles is conducted in order to evaluate whether there are patterns according 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 as 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. Accordingly, the main costs of a company are represented by personnel expenditures followed by costs for the building and production process and administration/office costs. It could be interesting for future examination how processes can be created or transformed for a better efficiency around personnel related work and to enhance potentials.

The most recurring strengths and key factors identified in the analyzed 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.
Acknowledgement

This work has been co-funded by the Horizon 2020 Framework Programme of the European Union within the project CRAVEzero - Grant Agreement No. 741223 (www.cravezero.eu)

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