Monetary Valuation and Environmental Costs in German Construction: Methods & Impacts

Wissenschaftliche Arbeit zur Erlangung des Grades

M.Sc.

an der TUM School of Engineering and Design der Technischen Universität München.

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Lehrstuhl für energieeffizientes und nachhaltiges Planen und Bauen

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Eingereicht am München, den 20.08.2024

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Acknowledgment

This work would not have been achieved without the support of many individuals, to whom I would like to express my gratitude.

First, I thank God for making the odds work in my favor and blessing me with a highly supportive group during my master's degree.

Also, I want to express my genuine appreciation to my supervisor, Chujun Zong, for her continuous academic and personal support in writing my master's thesis. Moreover, I appreciate her effort, availability, and participation in regular and spontaneous meetings and follow-ups.

Finally, I want to express my profound appreciation for my family and friends. I could not achieve this work without their support, love, and prayers.

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Abstract

The present environmental situation is highly unpleasant. After all, the construction sector alone is responsible for nearly 39% of the CO2 emissions and 36% of the final energy use. Moreover, there is a resolute claim that economic barriers obstruct environmental improvements. To address this issue, it is essential to consider the environmental costs of construction materials and investigate their contribution to the total cost. This was achieved through a comprehensive literature review where monetary factors were collected from studies conducted within the European and German context to create maximum, minimum, and mean scenarios. Then, prices for 108 different building elements in Germany were calculated using LCA and LCC as the base. To account for future price uncertainties, four calculation cases were created to consider discount rates and price variations. Building on these steps, the research case study was developed. It has indicated the substantial impact of the environment on the total price of building elements, as it can account for up to 72% of the total cost for construction elements. Also, it demonstrated the necessity of considering a more comprehensive range of environmental impacts on the environmental cost calculations, as it showed that relying on GWP cannot adequately represent these costs. Finally, it showed that the CO2 price set by the German government is insufficient to cover the environmental costs associated with construction elements.

List of Abbreviations

AP: Acidification potential

ADPE: Abiotic depletion potential of elements

BNB: Bewertungssystem nachhaltiges Bauen (building sustainability evaluation system)

DGNB: Deutsche Gesellschaft für nachhaltiges Bauen (German sustainable building council)

EC: Environmental cost

EP: Eutrophication potential

GHG: Greenhouse gas

GWP: Global warming potential

LCA: Life cycle assessment

LCC: Life cycle costing

ODP: Ozone depletion potential

POCP: Photochemical ozone creation potential

WTP: Willingness to pay

RSL: Reference service life

RSP: Reference Study Period

1 Introduction

1.1 Background

The current climate condition is not improving, as the intensity of climate change is still increasing and getting more intense yearly, causing hundreds of millions of people to suffer from the effects of these severe weather events (United Nations Environment Programme, 2023). Germany has made a clear contribution significantly to this issue as it is one of the 20 largest carbon-emitting countries, and the country is responsible alone for 2% of the total emissions, as shown in Figure 1(Ellerbeck, 2022)

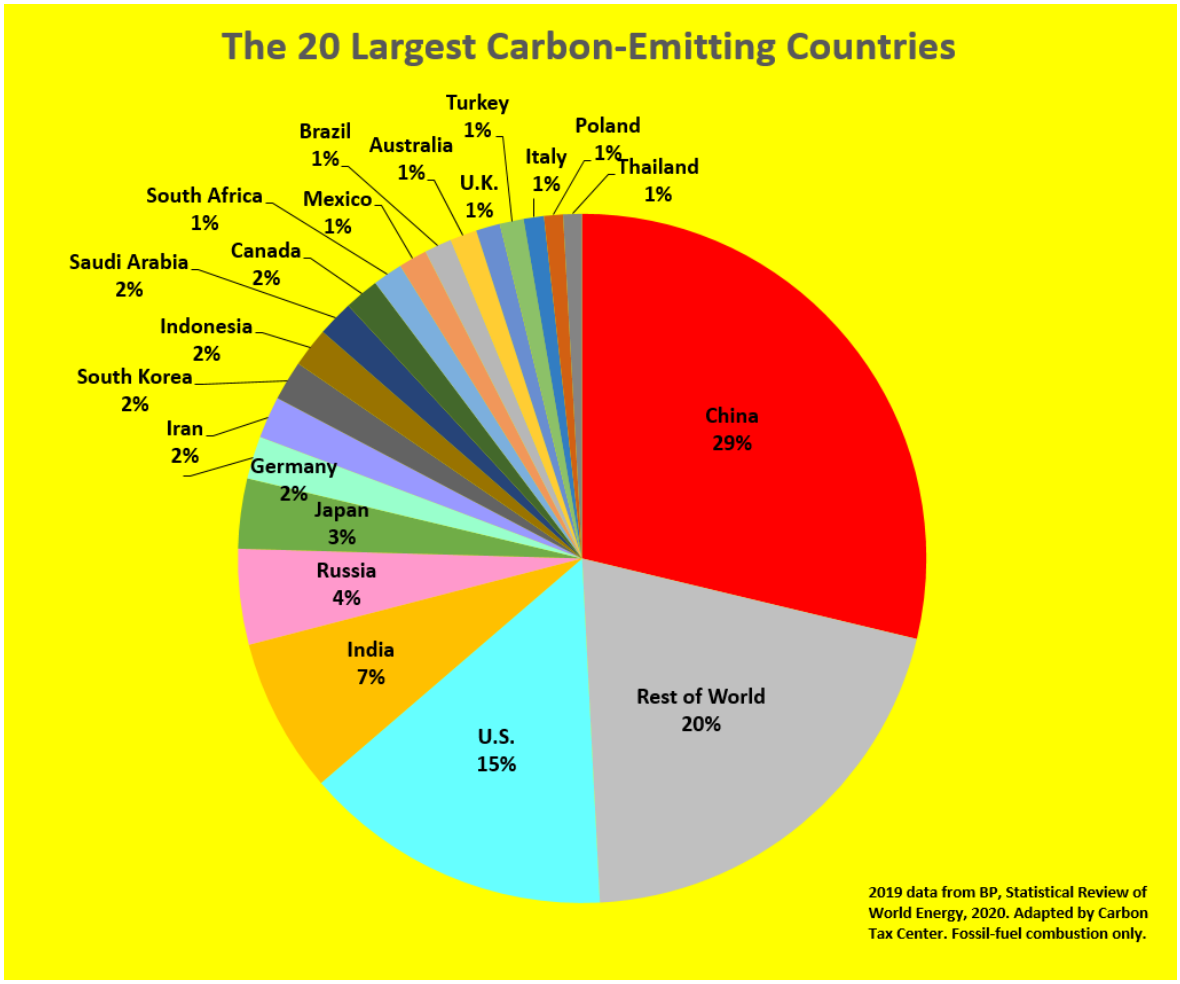

Figure 1 The 20 Largest Carbon-Emitting Countries

Furthermore, the construction industry is a significant contributor to the ongoing environmental crises; according to the International Energy Agency, the sector alone accounted in the year 2018 for 39% of energy and process-related carbon dioxide emissions and 36% of final energy use (International Energy Agency (IEA), 2019). In addition, the total CO_2 and energy consumption of the construction sector has increased above the period before the coronavirus, as CO_2 emissions are 2% higher than the peak value in 2019, despite the considerable increase in investment and the global level of success in reducing the building's energy intensity (UN Environment programme, 2022). Furthermore, the sector is responsible for consuming significant material resources, particularly minerals and metals, from the European reserves (Schneider-Marin & Lang, 2022). Despite the increasing global demand for comfortable indoor environments, a considerable share of the worldwide greenhouse gas (GHG) emissions are already emitted by the architecture, engineering, and construction (AEC) sector (UN Environment programme, 2021). The building type with the highest share of CO2 emissions is residential through indirect emissions, with 11.06% of the worldwide CO2 shares, and the non-residential buildings come in second place through indirect emissions as well with 7.38%, while building construction comes in third place with 6.79%, as shown in Figure 2 (Cumbrera, 2023).

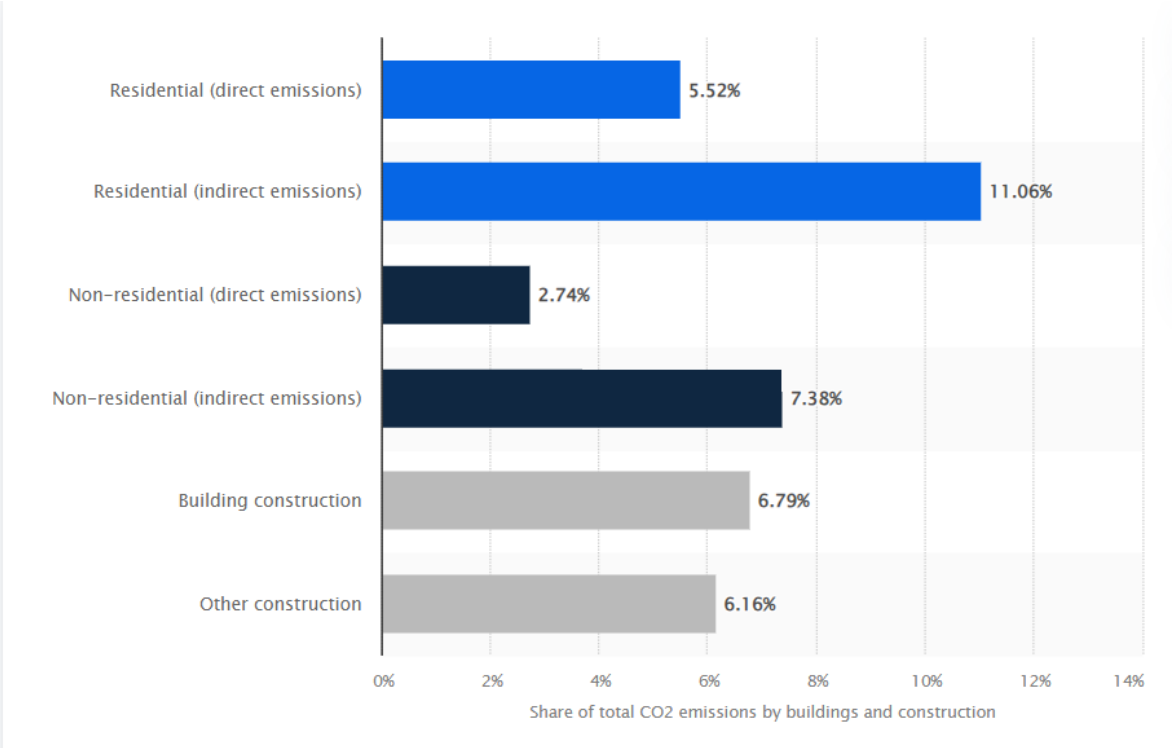

Figure 2 CO_2 emissions of buildings and the construction industry as a share of all emissions worldwide in 2022 by segment (Cumbrera, 2023)

Regularly, it is claimed that one of the main reasons for the hampering of any positive change in this industry is economic barriers. For this reason, it is crucial to consider the financial factors when calculating the emissions for various buildings and vice versa. Moreover, it is vital to take a long-term perspective when designing buildings, evaluating the entire life cycle rather than just short-term factors. Changing the perspective can be achieved by considering the life cycle cost and emissions instead of just focusing on investment costs and emissions from operational energy use alone, which are the main focus of the building regulations. (Schneider-Marin & Lang, 2022)

Henceforth, it is crucial to consider the economic impact of environmental factors in the design decision, which can be achieved by integrating the LCA and LCC results into the design process. Several research papers have investigated the relationship between LCA and LCC and how it can benefit building design by integrating long-term economic and emissions calculations. The integration is achieved by monetarizing the environmental factors to consider their influence in the design phase. (Schneider-Marin & Lang, 2022)

Monetarization methods can allow the integration of LCA and LCC and express the results of both tools in monetary units (Schneider-Marin & Lang, 2022). The integration is achieved by considering several environmental factors and comparing them to economic costs and benefits by applying the cost-benefit analysis. Therefore, monetary valuation has a significant potential to be part of the LCA results. (Pizzol et al., 2015)

Finally, monetary valuation can better influence the planning, as it helps consider environmental costs, which have high economic relevancy, as they are responsible for 20% of the global gross domestic product per year, as demonstrated in the Stern report, which was introduced in 2006. In the German context, 241 billion euros in 2021 was caused by electricity, roads, and heat generation by greenhouse gas- and air pollutants. (Wilke, 2013).

1.2 Problem Statement

The influence of environmental aspects in the design phase is often diminished by the presence of multiple complex environmental elements, which pose comprehension challenges for stakeholders. Besides the numerous factors, these factors do not have a standard evaluation measure nor directly comparable units, and trends can vary based on the building materials utilized. This results in different factors contradicting one another, making overall optimization challenging. (Schneider-Marin et al., 2022) Hence, monetizing the environmental emissions can result in having a standard evaluation method. Several monetary valuation

methods can be used to internalize the environmental emissions that are to be considered in the planning phase. Nevertheless, it is not a standard method to use monetary valuation in the construction industry in Germany (Schneider-Marin & Lang, 2020). Also, in several research papers, the environmental costs are calculated solely based on the GWP while ignoring the other midpoint impact categories. This raises the need to assess how using these methods in Germany and calculating other midpoint impact categories can influence the planning phase and the selection of different construction elements.

1.3 Research Questions

This part will introduce the research questions for the master thesis. These questions are essential to research because they guide the research direction and help the researcher focus on accomplishing the research aim and objectives. The research asks the following questions:

1. What is monetary valuation, and which methods and regulations are used in Germany to consider the environmental costs?
2. How can monetary valuation influence building elements selection in the given context, and what proportion of the total cost do they represent?
3. In what way do the environmental factors contribute to the final environmental cost?
4. How does the current CO2 price implemented by the German government compare to the environmental costs calculated in this research under different scenarios?

1.4 Research Aim and Objectives

This research aims to take significant steps to tackle climate issues by assessing different national and European monetary valuation frameworks relevant to the German context. To promote the significance of environmental costs in the total cost and to consider the most sustainable and cost-efficient elements in the design phase. This aim can be realized through the following objectives:

1. Provide an in-depth understanding of monetary valuation and emphasize its significance in selecting the most cost-efficient building elements in the design phase by estimating environmental costs in a database of varying construction typologies of building components, implementing different scenarios and calculation cases.

2. Highlight the significance of different midpoint impact categories in determining the overall environmental cost by showing the contribution of each impact category to the total environmental costs.

3. Compare the current established German CO2 price with the outcome of the monetary valuation in the research's case study to assess the CO2 price representation of the environmental costs.

1.5 Thesis Structure

This part shows how different research chapters are structured and which key points will be introduced in each chapter. The research paper is structured as follows:

1. The first chapter in this research is the introduction chapter. The chapter will give an overview of the topic to the readers. Moreover, it will define the central problem the research aims to overcome, its goals, and the questions it desires to answer. Finally, the research will present the study's significance and highlight the structure of each chapter in this research.
2. The second chapter is the literature review chapter. The chapter will provide an in-depth understanding of several terminologies and methods used in the case study. The chapter will start by explaining LCA in detail. Subsequently, it will explain monetary valuation by providing a clear definition. Finally, it will introduce several international and national methods to monetize the environmental impacts. It will highlight which economic factors were considered, the spatial boundaries, the calculation approach of the monetary factors, and the environmental impact categories and their financial values.
3. The third chapter is the methodology chapter. In this chapter, the research approach will be discussed in detail. The chapter introduces the methodology in different steps, where similar tasks are grouped. Afterward, the chapter will explain every block in depth to determine the research path to achieve its objectives and answer its questions.
4. The fourth chapter is the results and discussions chapter. This chapter compares the results of all scenarios and the four calculation cases to determine the influence of environmental costs in selecting and ranking the most cost-efficient building elements within the same group. Subsequently, the environmental costs of all building elements will be compared to find those with the highest and lowest environmental costs in euros

per m2 and as a percentage of the total cost. Finally, the CO2 price implemented in Germany will be compared with the environmental costs of building elements.

5. The fifth chapter is the summary chapter. The chapter introduces the research conclusion, highlighting how the research could successfully achieve its objectives and answer the research questions. Subsequently, the chapter identifies research limitations to emphasize areas for future development by future researchers in this study. Finally, the chapter will introduce the research's summary to highlight what was achieved in each chapter.

2 Literature Review

This chapter will begin with an overview of Life Cycle Assessment (LCA) to provide a comprehensive understanding of this essential tool, as it is the first step to calculate the environmental costs. Afterward, a detailed explanation of monetary valuation will be provided, outlining the methods, advantages, environmental costs, and the topic's relevance within the German context. Finally, various studies on monetary valuation will be examined, focusing on each study's key aspects. This will include LCA midpoint impact categories, study duration, economic factors, monetization approach, and most importantly, the monetary factors employed or developed.

2.1 Life Cycle Assessment (LCA)

LCA is the process used to calculate the environmental impact, which can result from objects or products using a standardized database. European Standard (EN) 15978, presented in Figure 3, provides the common standardized European framework for the LCA stages. LCA stages are divided into four main stages and are the following: Stage A (product and construction process stages), Stage B (use stage), stage C (end of life stage), and the final stage, stage D (potential benefits and loads). These four stages take into account the environmental emissions of products from the very beginning as raw material until their disposal. (Waldman et al., 2020) These four stages allow the LCA to offer a comprehensive and structured environmental assessment for the performance of the materials and to allocate improvement areas (Barbhuiya & Das, 2023).

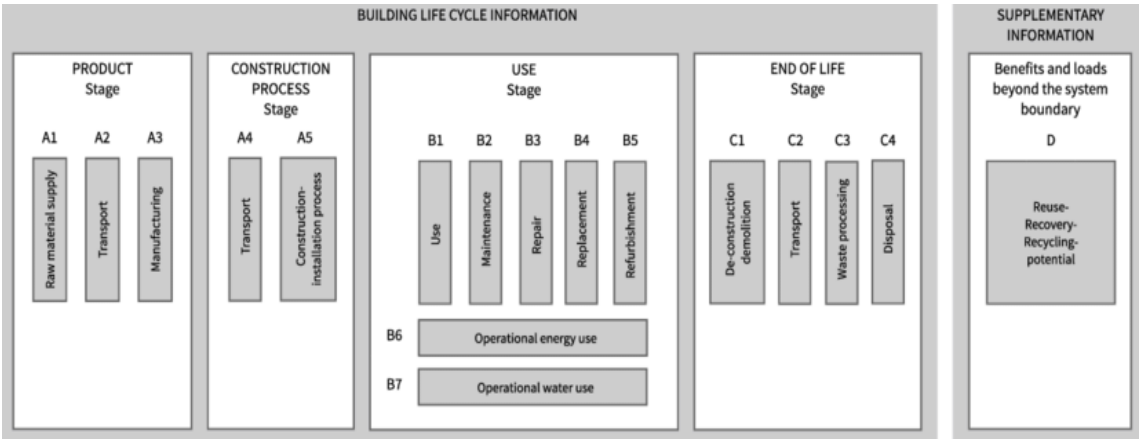

Figure 3 LCA stages

2.1.1 History of LCA

In the 1960s, the first glimpse of LCA was brought to the surface through a collaboration between universities and industries when it became clear that environmental degradation, particularly limited access to resources, was a significant issue. The term LCA was introduced or normalized before the 1990s, as it used to be called Ecobalance or Resource and Environmental Profile Analysis (REPA). In addition, the intense development and application of LCA started nearly 30 years ago as the first official guidelines for LCA; the SETAC code of practice for LCA was developed in 1993 and followed by the initiation of a formal standardization process under the charge of the International Organization of Standardization (ISO) aiming to create a global standard. (Hauschild et al., 2018)

2.1.2 Advantages of LCA

The LCA method is a widely recognized and well-established method for its comprehensive assessment of the environmental impact of products (Sandin et al., 2014). Also, the LCA method can contribute significantly to design optimization, as it supports designers and engineers in making decisions by offering detailed information about the environmental implications of design choices. Moreover, the construction projects' environmental performance can be optimized by considering the life cycle impacts. (Barbhuiya & Das, 2023) Furthermore, the outcome of the LCA process can play a role in several areas within the construction industry, such as assessing buildings, providing recommendations for design scenarios, and supporting specifications and decision-making (Waldman et al., 2020). LCA can address cross-media difficulties and prevent issues from being transferred from one place to another and from one medium to another (Curran, 2013).

2.1.3 Functional Unit

Defining the functional unit is essential to building and modeling a product system in LCA. It acts as a quantified description of a product's function and serves as the foundational reference for all impact assessment calculations. Moreover, various features of the studied product, such as cost, technical quality, performance, aesthetics, etc., represent the product's function. (Arzoumanidis et al., 2020)

In addition, it is essential to note that the functional unit varies across different sustainability certification systems and is not consistently defined in research studies. DGNB and BNB, specifically, as representatives of the German building sustainability certification systems,

express the results of LCA as indicators per m2 NFA (net floor area) per year. (Schneider-Marin & Lang, 2022)

2.1.4 LCA in Germany

According to the DIN Deutsches Institut für Normung e.V, the life cycle assessment process includes four significant steps: goal and scope definition, inventory, impact assessment, and interpretation. Moreover, the calculations of the LCA in Germany use the ÖKOBAUDAT database, which is publicly available and includes a database for life cycle inventory and life cycle impact assessment with about 1000 building products and processes, as a reference for the calculation. (Schneider-Marin et al., 2022). Moreover, a significant tool that uses a building materials database based on ÖKOBAUDAT for LCA is eLCA. It was developed in a project by BEIBOB Medienfreunde, Germany, within the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety. This open-source online tool can be accessed at no cost via www.bauteileditor.de. The elca tool encompasses the following assessment levels: building materials, templates of construction elements, and projects. (ÖKOBAUDAT, 2014)

2.1.5 LCA Environmental Impact Categories

As mentioned, several midpoint impact categories are available for each material in LCA. However, ÖKOBAUDAT offers information only about those in Table 1 (*ÖKOBAUDAT*, 2024). Table 1 introduces the midpoint impact categories, accompanied by a brief explanation and the measuring unit to enhance the understanding of the LCA.

Table 1 LCA midpoint impact categories of ÖKOBAUDAT (Borschewski et al., 2023; Densley Tingley et al., 2015; *ÖKOBAUDAT*, 2024)

Impact category	Unit	Explanation
GWP	kg CO2 eq.	It represents the impact of greenhouse gases on climate change.
ODP	kg CFC-11 eq.	Ozone depletion potentials are utilized to convert gases to CFC-11 equivalent.

AP	Mole of H+ eq.	It is built on accumulated exceedance, encompassing atmospheric transportation and emissions deposition responsible for various ecosystems' susceptibility.
EP (terrestrial)	Mole of N eq.	It is built on accumulated exceedance, evaluation of soil and atmospheric conditions responsible for biodiversity sensitivities in various areas.
EP (freshwater)	kg P eq.	An estimation for the transferred nutrient concentration to the freshwater aquatic environment focusing on phosphorous.
EP (marine)	kg N eq.	It is the same as the previous one but focuses on marine aquatic environments and the assessment of the nitrogen equivalent concentrations.
POCP	kg NMVOC eq.	Responsible for increasing the concentration of ozone in the troposphere.
WDP	m^3 world equiv.	Represents the local scarcity in relation to the use of water.
ADPE	kg Sb eq.	It denotes the decrease in non-renewable resources.

ADPF	MJ	It represents the ratio between the execration of fossil fuels and the available reserves.

2.1.6 Challenges in LCA

Unfortunately, stakeholders in the construction sector find it complex to understand the full results of LCA. In addition to the absence of standard evaluation units, the final report can contain up to 23 individual indicators, which show different issues and cannot be used directly to inform choices or in the course of action during the planning phase. (Schneider-Marin et al., 2022) Moreover, despite the approach used to calculate LCA, a certain level of skills is still required to understand the study information due to the high complexity. This implies that procurement departments still need to possess knowledge, even if LCA data is available for various products, in order to select the most optimal product for a particular application. Furthermore, due to the absence of environmental benchmark data, public authorities find selecting and differentiating between different products complex. (Benetto et al., 2018)

2.2 Monetary Valuation

First and foremost, it is vital to understand the definition and the Elucidation of monetary valuation to thoroughly comprehend the monetary valuation of environmental factors. Also, exploring the diverse techniques employed to monetize non-market goods. The history of monetary valuation vital part as well of the literature review. Moreover, to get a better in-depth understanding of the influence of utilizing monetary valuation techniques on individuals' lives, the benefits of monetizing environmental impacts will be highlighted. Furthermore, the monetary valuation of environmental factors will also be assessed within the German context by presenting relevant research studies, the current German regulations, and reports developed by the German environmental agency on the subject matter. This endeavor will enable the address of the first research question and the meeting of the first research objective.

2.2.1 Definition and Elucidation

Monetary valuation has been defined by (Weidema et al., 2013) as “the practice of converting measures of social and biophysical impacts into monetary units so that they can be compared against each other and against the costs and benefits already expressed in monetary units.” It is used to provide non-market goods, i.e., goods for which there is no physical counterpart and

does not have an existing market, such as biodiversity and human well-being, as well as economic value (Pizzol et al., 2015). According to ISO 14008, the methods used for monetary valuation do not determine the absolute value of the environment but rather the economic values of changes in the environment (*ISO 14008*, 2019). Nowadays, environmental and social cost-benefit analysis (CBA) is considered a crucial field in which the monetization of environmental impact methods is currently active.(Arendt et al., 2020).

2.2.2 Ethical Claims and Objections

Despite the considerable significance of monetary valuation, ethical concerns arise from a standpoint commonly established in several sustainability approaches that specific values cannot be traded or monetized. These concerns also stem from the misconception that monetary valuation can quantify things like human life or biodiversity. Nevertheless, the scope of monetary valuation is only restricted to minor changes in calculating the value of goods unavailable in the market. (Arendt et al., 2020)

2.2.3 Main Approaches

Market prices are not generally used to estimate the monetary values of environmental impacts, as they rarely exist for them. Therefore, several approaches have been developed to calculate the economic value of non-market goods, and they are primarily divided into two categories, each reflecting either personal or group preferences and financial limitations. (Allacker & De Nocker, 2012)

The damage function approach defines the first approach, as it calculates the financial cost of adverse effects on welfare. This can be achieved through a detailed analysis to determine how specific welfare outcomes, such as health effects, agricultural production loss, and building soiling, will be affected by environmental or emission burdens. The first approach involves assigning a monetary value at the final stages of the life cycle impact assessment (LCIA). The valuation of the specific impacts is derived from an individual's willingness to pay (WTP) to forestall these impacts, which reflects their individual preferences and budget limitations. Therefore, this method is commonly known as the WTP approach. (Allacker & De Nocker, 2012)

The second approach is the marginal abatement cost (MAC) approach, often referred to as the maximum abatement cost method by some scholars. It is also recognized for its focus on cost reduction, avoidance, prevention, and control. In this approach, the expenses associated

with extra emissions reduction actions that are obligatory to be undertaken by the other sectors to offset the emissions from the construction sector are the base of the monetary values. These costs are influenced by which actions have already been implemented and which sectors have to act. In this approach, the calculated monetary values are influenced by the policy goals and strategies associated with these environmental issues, where these goals and strategies reflect the shared preferences and budget constraints of society. (Allacker & De Nocker, 2012)

2.2.4 History and Development

The call to consider the environmental costs in the construction industry is not a recent one. In 1990, it was mentioned in the Green Paper on the Urban Environment issued by the European Commission that there is a need to internalize external costs of the construction industry. Furthermore, the report stated that even though the environmental costs are not internalized, the market has the potential to make it part of the overall costs. (Allacker & De Nocker, 2012)

However, the valuation of environmental impacts is a practice that has been introduced previously, as it goes back to 1936 when it first became an essential and ubiquitous part of environmental and economic research (Massimo Pizzol et al., 2015). In 1989, the monetary valuation of environmental factors was first introduced as cooperation between Volvo, the Swedish Federation of Industries, and IVL Swedish Environmental Research Institute; the Environmental Priority Strategies in Product Design (EPS) came to light to be one of the first methods for monetary valuation (Tekie & Lindblad, 2013). Since the development of the EPS method, several methods have come to light, such as the Lime method, which was developed in Japan and updated three times, or the EVR (Environmental-Costs/Value-Ratio) method, which has been updated many times by Vogtländer, Brezet, and Hendriks (Arendt et al., 2020).

In 1999, Finnveden first mentioned monetary valuation in LCA when he examined numerous approaches; among other methods, he mentioned EPS. He could conclude that several factors were responsible for restraining their implementation in LCA, and they were the following: assumptions, limitations in data, and inconsistencies. Furthermore, to date, the topic of monetary valuation in LCA has been examined in six peer-reviewed studies, each with differing scopes and key findings. (Arendt et al., 2020)

2.2.5 Advantages

Policymakers and stakeholders can benefit significantly from the monetary valuation as it can determine projects, services, and products' overall environmental quality and offer them

valuable information, as it allows product and services' current market prices to be compared with environmental costs (Schneider-Marin & Lang, 2020; Swarr et al., 2011).

Additionally, environmental criteria can be part of cost-benefit analysis (CBA) and play a role in the decision-making process in businesses when monetary values are assigned to the environmental factors (Reid et al., 2005). Currently, monetary valuation plays a significant role in several approaches by assigning an economic value to the LCA outcomes because of the significance of the LCA as a powerful and recommended management tool to measure the environmental effects throughout the life cycle, to be used as a measure of ecological performance to calculate a unified value or to create a link between LCA and CBA (Arendt et al., 2020).

The main advantages of monetary valuation in the construction sector can be summarized in the following points: different design solutions can be compared based on the ecological and economic aspects, and merging numerous environmental factors into a single, comprehensible measure (Schneider-Marin & Lang, 2020). Furthermore, assigning monetary value to environmental impacts can result in resolving the LCA's complexity issue due to the complexity of the LCA full report, with several impact categories, and the absence of standard evaluation units (Arendt et al., 2020). This can result in introducing LCA results to stakeholders efficiently and effectively and providing them with a clear comparison of different design options (Schneider-Marin & Lang, 2020).

2.2.6 Monetary Valuation in Germany

As mentioned before, no monetary valuation method is geared explicitly toward LCA in Germany at the moment. However, several studies have researched the topic of monetary valuation within the German context. In addition, several actions have been taken by the German government to help consider the environmental costs, such as CO2, and reports issued by the German government's environmental agency.

In 2022, the Technical University in Munich published research conducted by associate Professor Patricia Schneider and Professor Werner Lang to create a framework called ECO2 to integrate the results of LCC and LCA in the German construction market by monetizing the LCA factors (Schneider-Marin & Lang, 2022). The study will be introduced in more detail in section 2.3.1.

Another study on monetary valuation within the German context was introduced by (Förster et al., 2019). The study was developed in cooperation with the German environmental agency to

fill the gap between the loss of ecosystem services in Germany and its unidentified economic cost and benefits. This aim could be achieved through the following steps: identifying the information needed to update the methodological convention of the environmental agency, developing a database, and conducting a literature review on a total of 109 monetary valuation studies, focusing mainly on forests and wetlands, for ecosystem change in Germany resulted in a change in ecosystem services. In the third step, the criteria for qualifying economic valuation studies are to be used in decision-making regarding changes in the ecosystem that resulted in changes in ecosystem services. This was achieved through a collaboration between the German Environment Agency and valuation experts. The study has concluded that only 5.5%, or 6 out of 109 studies, could meet the criteria for informing such decisions.(Förster et al., 2019)

Moving on to the current established German regulations, since the year 2021, Germany has introduced the National Emissions Trading System (nEHS) for fuels to help reduce emissions (Poetschke, 2020). It is a fixed CO2 price, which was 25 euros per ton of CO2, and is planned to reach 55 (Poetschke, 2020). In 2024, the CO2 price has reached 45 euros per ton of CO2 (Die Bundesregierung, 2024). However, the nEHS still does not pose an impact on climate protection as it is the driver of the trend in energy prices because the fixed prices are considered relatively low.(Burger et al., 2023). Moreover, starting in 2027, the European Emissions Trading System (EU ETS 2) will replace the current regulation, which will result in a significant unpredictable increase in the CO2 price (Burger et al., 2023). Therefore, it was recommended among support programs to start doubling the CO2 price starting from the year 2024 to 90 euros per ton (Burger et al., 2023).

In addition to the current regulations for the CO2 price, the German environmental agency has created the Methodological Convention for the Determination of Environmental Costs. The method builds on the progress of professionals from several esteemed research institutes, namely INFRAS, Fraunhofer ISI, KIT, and CE Delft. The aim was to create a tool to determine the environmental costs through transparent and uniform criteria by considering the current state of the research. This is important because there is a need to use scientifically recognized assessment methods in order to reliably estimate environmental costs. The final two publications were the Methodological Convention 3.0 and Methodological Convention 3.1. The first shows, based on the type of environmental damages, the best-suited method for estimating the environmental costs, while the latter includes, among other things, best-practice monetary factors for environmental costs due to GWP, conventional air pollution, phosphorus, and nitrogen. Moreover, it contains environmental impact cost rates due to building materials, transport, electricity and heat generation. (Wilke, 2013)

2.2.7 Environmental Cost

Internalizing the environmental aspects in decision-making, such as in planning and policymaking, is a growing priority at distinct levels of government and private and public sectors. However, they can be monetized by using monetary valuation methods. The proper monetization approach can be selected depending on the advantages and disadvantages of each method. (Zhao et al., 2022)

In Germany, Europe, and worldwide, numerous studies estimate environmental costs with varied estimations depending on their research methodology and the national circumstances, as the estimation of environmental costs is a crucial topic. The estimation serves many purposes, as it can indicate the high price consequences of unsuccessful environmental protection and determine the economic impact of achieving the environmental goals. Moreover, it can highlight environmental and climate policy measures. Costs and benefits. (Wilke, 2013)

Furthermore, society can suffer from the prohibitive cost of pollution, which can be recognized as environmental damage to materials and health by affecting the crops and the ecosystem. Therefore, the environmental emissions should be monetarized and paid for by those responsible for environmental pollution. This is vital because the current measures to reduce pollution are unfortunately ineffective, and the financial motivations to take action are still absent.(Wilke, 2013)

2.3 Previous Studies in Monetary Valuation

Several research papers have investigated the relationship between cost and environmental impacts on decision-making using and developing monetary valuation methods while following different approaches. An overview of seven previous studies will be introduced, and each study's aim, work approach, and main criteria will be highlighted. Afterward, the monetary values of the midpoint impacts used and developed by each study will be summarized to create different scenarios.

2.3.1 ECO2 Framework

Starting with the research introduced by the Technical University of Munich. The university previously published different research papers on this topic, and a framework was introduced in 2022 to combine the economic and environmental life cycle approaches (Schneider-Marin et al., 2022). The Eco² framework, which refers to ecology × economy, focuses mainly on the

long-term results instead of the short-term ones. Added the authors, Eco² maps the economic and environmental data and standard data such as reference service lives (RSLs) to a shared life cycle inventory for LCC and LCA. Monetary valuation in the context of the Eco² framework allows for integrating the outcomes as a base for early design decisions through assessing various environmental impacts. The case study in this research was conducted on a small office building in Germany while using mainly German references for the calculation of LCA, LCC, and the temporal parameters. (Schneider-Marin & Lang, 2022) Additional key aspects of the study are highlighted in Table 2.

Table 2 ECO2 framework (Schneider-Marin & Lang, 2022)

Year	2022 (published)
Environmental valuation method	Not mentioned (the monetary values were based on several previous studies)
Spatial boundaries of impact models	Germany, as the German references were the basis of the case study to provide a national framework to integrate LCA and LCC results
Study period	50 years
Impact categories (midpoint)	(GWP), global warming potential, (ODP) ozone depletion potential, (AP) acidification potential, (EP) eutrophication potential, (POCP) Photochemical oxidation, (ADPE) abiotic depletion potential non-fossil resources
Temporal parameter (discount factor)	1.5%
Temporal parameter (yearly price increase)	2% (construction materials) & 5% (energy and environmental costs)

Temporal parameter (Yearly reduction in EC due to the increase in renewable electricity sources)	1.6% (reduction in the EC value)
Unit	Euro

2.3.2 ECOVALUE

The second study is Ecovalue, which was developed in 2009 and updated once more in 2012 to support the design decision by assessing the environmental impacts of different projects and products (Tekie & Lindblad, 2013).

First, Ecovalue08, which is the study's first version, was introduced to provide a weighting set in order to calculate market values and environmental quality for resource depletion (Ahlroth & Finnveden, 2011). The study methodology is divided into two main steps. The first step involves collecting different resource uses and emissions within impact categories. The weighting of impact categories against each other took place in the second step; the monetary factors were developed using the individual's willingness to pay (WTP), which was introduced in section 2.2.3, and the market price. The factors were derived from previous studies that followed the previously mentioned approaches. (Tekie & Lindblad, 2013) Moreover, three case studies were used to apply the weighting set, and the output was compared with the output of the weighting sets from the following studies: Ecotax02, Ecoindicator99, and EPS2000. (Ahlroth & Finnveden, 2011)

Afterward, Ecovalue12 was introduced in 2012 to provide updates to the existing Ecovalue08 by including two additional new impact categories and providing updated values for the previously developed weighting factors (Tekie & Lindblad, 2013). The LCA case study that was used to test the weighting set updated in Ecovalue12 was reading a magazine on a tablet (Finnveden et al., 2013). Furthermore, the characterization methods ReCiPe (Goedkoop et al., 2009) and Cumulative Exergy Demand (Bösch et al., 2006) were combined with the updated weighting set in the case study (Finnveden et al., 2013).Table 3 shows the key criteria in both studies.

Table 3 Ecovalue08 and Ecovalue12 (Ahlroth & Finnveden, 2011; Finnveden et al., 2013; Tekie & Lindblad, 2013)

Year	Ecovalue08 2009 & Ecovalue12 2012

Environmental valuation method	WTP and market prices
Spatial boundaries of impact models	Sweeden
Study period	It varies depending on the study referenced
Impact categories (midpoint) in Ecovalue12	(GWP) global warming potential; (AP) acidification potential; (EP) eutrophication potential; (POCP) Photochemical oxidation, (ADPE) abiotic depletion potential, Human toxicity, Marine water toxicity, and Particles
Temporal parameter (discount factor)	Not specified
Temporal parameter (yearly price increase)	Not mentioned
Temporal parameter (Yearly reduction in EC due to the increase in renewable electricity sources)	Not mentioned
Unit	Swedish Kronor (SEK)

2.3.3 EPS

The third study is the Environmental Priority Strategies in Product Design (EPS). As mentioned, it introduced, in the 20th century, the monetary valuation of environmental factors for the first time (Tekie & Lindblad, 2013). Following the framework standard ISO 14008, environmental experts and economists created the monetary factors. Throughout the years, several versions of EPS have been developed and published, and the latest version is EPS Version 2020d. (Steen et al., 2020). The key aspects of EPS 2020d are illustrated in Table 4.

The study was conducted to provide different decision-makers with time-efficient recommendations on comparable products, taking into account the long-term environmental emissions over the products' life cycle and allowing economic evaluation of the alternatives to facilitate informed decisions regarding their acceptability. The EPS system has a considerable

advantage in decision-making, providing a critical and instant estimation followed by a more comprehensive analysis if the issue is deemed significant. This advantage enables the system to function similarly to typical economic considerations. (Steen et al., 2020)

Table 4 EPS method (Steen et al., 2020; Tekie & Lindblad, 2013)

Year	The first version in 1989, EPS version 2020d, was published in November 2020
Environmental valuation method	WTP for damage avoidance
Spatial boundaries of impact models	Global
Study period	As long as the impact exists
Impact categories (midpoint) in EPS 2020d	(GWP) global warming potential, (AP) acidification potential, (EP) eutrophication potential, (ADPE) abiotic depletion potential, water toxicity, Land occupation impact on biodiversity, and Particles
Temporal parameter (discount factor)	0%
Temporal parameter (yearly price increase)	Not mentioned
Temporal parameter (Yearly reduction in EC due to the increase in renewable electricity sources)	Not mentioned
Unit	Euro

2.3.4 Stern Review

The fourth study is the Stern. Review of the Economics of Climate Change, which Sir Nicolas Stern carried out, was created to report to the United Kingdom's Prime Minister and the Chancellor of the Exchequer (Tol, 2007). The study was seen as one of the most

comprehensive surveys in the area of the economics of climate change (Hepburn & Beckerman, 2007). The study concluded that the world still has enough time to mitigate the severe impacts of climate change, but there is still an indispensable need for instant international cooperation (Stern, 2006). Moreover, Failing to seize the opportunity in time will result in considerable progressive cost increases and irreversible environmental impacts (Tekie & Lindblad, 2013). The key aspects of the study are shown in Table 5.

The study is divided into two main parts. The first part of the review focuses on how uncontrolled climate change can impact human lives and the various risks that can emerge from it. It also examines the costs and opportunities associated with taking action to address it. The review could conclude that while all nations will be impacted by climate change, the effects will vary. The countries that will experience the most severe and earliest effects are the poorest ones. (Stern, 2006)

The second part of the review focuses on the policy of shifting toward an environmentally friendly global economy with low carbon by inspecting the national and international challenges associated with it. The review has mentioned the following policies (Stern, 2006):

- Pricing of carbon through CO2 taxes, rules and regulations, or emissions trading.
- Technology policy to develop and utilize products with high efficiency and low carbon.
- Educate and inform individuals about their roles and which actions they can take against climate change and eliminate obstacles to energy efficiency.

The review perceives climate change mitigation cost as a strategic long-term investment. Also, the Assessment Model, PAGE2002, is employed to calculate the damage cost of climate change. Monte Carlo simulation is used by the model to deal with uncertainty. Additionally, macroeconomic models assess the costs of mitigation and the impacts of transitioning to low-carbon energy systems. (Tekie & Lindblad, 2013)

Table 5 Stern. Review of the Economics of Climate Change (Tekie & Lindblad, 2013; Tol, 2007)

Year	2006
Environmental valuation method	Market values: estimated by using several methods for non-market values goods and the actual market value for consumption

Spatial boundaries of impact models	Global
Study period	100 years
Impact categories (midpoint)	Greenhouse gas
Temporal parameter (discount factor)	0.1%
Temporal parameter (yearly price increase)	Not mentioned
Temporal parameter (Yearly reduction in EC due to the increase in renewable electricity sources)	Not mentioned
Unit	US Dollar

2.3.5 MMG Method

The fifth study is the Development of an Approach to Assessing the Life Cycle Environmental Impacts and Costs of General Hospitals through analyzing a Belgian Case. The research objective was to investigate healthcare facility costs and environmental impacts, prominent drivers, and to detect quantitative assessment methodological obstacles. The case study in this research was the general hospital Sint Maarten in Mechelen, Belgium, where the long-term emissions and financial impacts were assessed by considering the life cycle approach. The monetary values used to calculate the EC in this study are derived from the MMG method, and the impact categories were derived from the CEN and CEN+ environmental indicators. (Stevanovic et al., 2019)

The MMG Method was created to provide a national framework in Belgium that complied with European standards to evaluate the environmental materials performance of the building elements. The objective of the developed model is to provide a better understanding within the national context of the ecological materials performance of the building elements, considering the entire life cycle of the building elements. This could be achieved by calculating the environmental impacts of several building elements and considering 1m2 of an element as the function unit. (Delem et al., 2011) The monetary values are derived from prevention cost

analysis. In the case of GWP monetary values, a meta-analysis of different models determined these values. Also, the global economy costs associated with upholding a 2° C as a global warming limit reflect the GWP monetary valuation. (Wille, 2018) The main aspects of the study can be demonstrated in Table 6.

Table 6 MMG Method (Stevanovic et al., 2019; Wille, 2018)

Year	2019 (the main study was published), MMG2017 in 2018
Environmental valuation method in MMG2017	Abatement costs methods & WTP for Eutrophication
Spatial boundaries of impact models	Belgium
Study period	30 years
Impact categories (midpoint) in EPS 2020d	(GWP) global warming potential, (ODP) ozone depletion potential, (AP) acidification potential, (EP) eutrophication potential, (POCP) Photochemical oxidation, (ADPE) abiotic depletion potential non-fossil fuel, (ADPf) abiotic depletion potential -fossil fuel, human toxicity water toxicity, Land occupation impact on biodiversity and Particles
Temporal parameter (discount factor)	1% & (3% in MMG 2017)
Temporal parameter (yearly price increase)	0%
Temporal parameter (Yearly reduction in EC due to the increase in renewable electricity sources)	Not mentioned

Unit	Euro

2.3.6 ECOTAX02

The sixth study is ECOTAX02, a method based on the environmental taxes and fees implemented in Sweden that evaluates LCA's new weighting factors set for different impact categories. The main objective of this study was to achieve a quantitative environmental valuation by using the environmental taxes and fees implemented in Sweden and based on political decisions. Furthermore, the ecological tax system in Sweden is as follows: different implemented environmental taxes and fees are associated with varying categories of impact to create a valuation method for the LCA. (Johansson, 1999) &(Tekie & Lindblad, 2013)

To create a reference equivalent weight, nine different midpoint impact categories were monetized by associating taxes or fees. Moreover, the method was evaluated by applying it to three different case studies and comparing the weighting set to the ones from the following studies: Ecoindicator99 and EPS2000. (Tekie & Lindblad, 2013) Table 7 illustrates the key aspects of the study.

Table 7 Ecotax02 (Johansson, 1999; Tekie & Lindblad, 2013)

Year	1999
Environmental valuation method	WTP
Spatial boundaries of impact models	Sweeden
Study period	It varies depending on the study referenced
Impact categories (midpoint) in Ecovalue12	(GWP) global warming potential; (AP) acidification potential; (EP) eutrophication potential; (POCP) Photochemical oxidation, (ADPE) abiotic depletion potential, Human toxicity, Marine water toxicity, Freshwater ecotoxicity, Depletion of stratospheric ozone, and Particles

Temporal parameter (discount factor)	Not included
Temporal parameter (yearly price increase)	Not mentioned
Temporal parameter (Yearly reduction in EC due to the increase in renewable electricity sources)	Not mentioned
Unit	Swedish Kronor (SEK)

2.3.7 ExternE

The seventh study is ExternE, which was developed at the end of the 20th century due to the cooperation between European and American experts to assess the externalities of energy use. The project and the follow-up projects successfully created Europe's most commonly used monetary valuation methods of externalities. (Tekie & Lindblad, 2013) The key aspects of the study can be shown in Table 8.

Several projects have followed the ExternE project, such as NewExt, which focused on improving the externalities assessment developed in the initial project and delivered its latest update in 2004. The projects focused on the following areas: enhancing the monetization method of mortality from air pollution, assessing the results caused by the non-nuclear fuel chain, valuing environmental impacts via political negotiations and referenda, and evaluating multi-media impact pathways effects. (Tekie & Lindblad, 2013)

Afterward, NEEDS, a five-year project that ended in 2009, was introduced based on the work achieved by the past projects. The project aimed to further analyze the costs and benefits of future energy systems and energy policies at the national level and within the European Union. (Tekie & Lindblad, 2013)

Finally, EcoSenceWeb, developed as part of the initial project, serves as a web-based software tool to evaluate single energy sources in Europe. Also, the EcoSenceWeb tool supports assessing external costs due to electricity generation and the associated environmental impact. The aim of developing this tool was to offer users a non-complex system that can operate with minimal data input and effectively conduct a standardized impact assessment. (Tekie & Lindblad, 2013)

Table 8 ExternE Method (Tekie & Lindblad, 2013)

Year	1995
Environmental valuation method	WTP
Spatial boundaries of impact models	Europe
Temporal boundaries of impact models	Varying, highest for radionuclides, 100000 years
Impact categories (midpoint)	In this method, only endpoint impact categories are included
Temporal parameter (discount factor)	0%, 3%, and 10%
Temporal parameter (yearly price increase)	Not mentioned
Temporal parameter (Yearly reduction in EC due to the increase in renewable electricity sources)	Not mentioned
Unit	Euro

2.3.8 Summary

Several papers have researched the topic of monetary valuation in various fields. In the last part of the second chapter, seven different research papers have been summarized, serving as the base for the key factors to develop the case study in this research. This part has only considered the relevant aspects by highlighting the midpoint impact categories, the economic factors used in each study, and the spatial boundaries, which was essential to ensure that the results can be relevant to the German construction industry by including only studies targeted the global and European countries.

Moreover, the maximum monetary values of each study are summarized in Table 9, where only the midpoint impact categories that will serve as the base to create this research case

study after a few adjustments in the next chapter are presented. Moreover, all values have been exchanged from SEK and USD to Euro based on the exchange rate on 04/06/202 based on the rates from the European Bank (European Central Bank, 2024).

Table 9 Summary of the monetary values of midpoint environmental impacts (Ahlroth & Finnveden, 2011; Finnveden et al., 2013; Schneider-Marin & Lang, 2022; Steen et al., 2020; Tekie & Lindblad, 2013; Wille, 2018)

Method/ Reference	**GWP** €/kg CO2	**ODP** €/kg R11	**AP** €/kg SO2	**EP** €/kg PO4	**POCP** €/kg Ethen	**ADPE** €/kg Sb
EPS 2020d	0.29	-	0.004	0.04	-	26,200.00
MMG (2017) Western European	0.20	100.00	0.88	60.00	6.60	6.23
Ecovalue12	0.49	-	2.63	58.77	3.51	-
Ecovalue08	0.18	-	2.63	19.12	3.51	-
ECO2	0.650	90.91	14.71	20.74	9.59	17,232.63
Ecotax2	0.06	105.26	1.58	2.51	4.2	-
Stern Review	0.08	-	-	-	-	-

Finally, the monetary valuation approaches used to develop the monetary factors in each study are illustrated in Table 10. Different methods for monetizing environmental emissions were explained in more detail in section 2.2.3.

Table 10 Environmental evaluation methods (Ahlroth & Finnveden, 2011; Finnveden et al., 2013; Schneider-Marin & Lang, 2022; Steen et al., 2020; Tekie & Lindblad, 2013; Wille, 2018)

	EPS 2020d	MMG (2017)	Ecovalue	ECO2	Ecotax2	Stern Review	ExternE
Environmental valuation method	WTP	Abatement costs & WTP for EP	WTP and market prices	-	WTP	Market values	WTP

3 Methodology

The third chapter of this research presents in detail the adopted approaches, methods, and workflow. The adopted methodology covers the research objectives presented in the first chapter. Also, it demonstrates the relation between research actions. The performed research activities are illustrated in Figure 4.

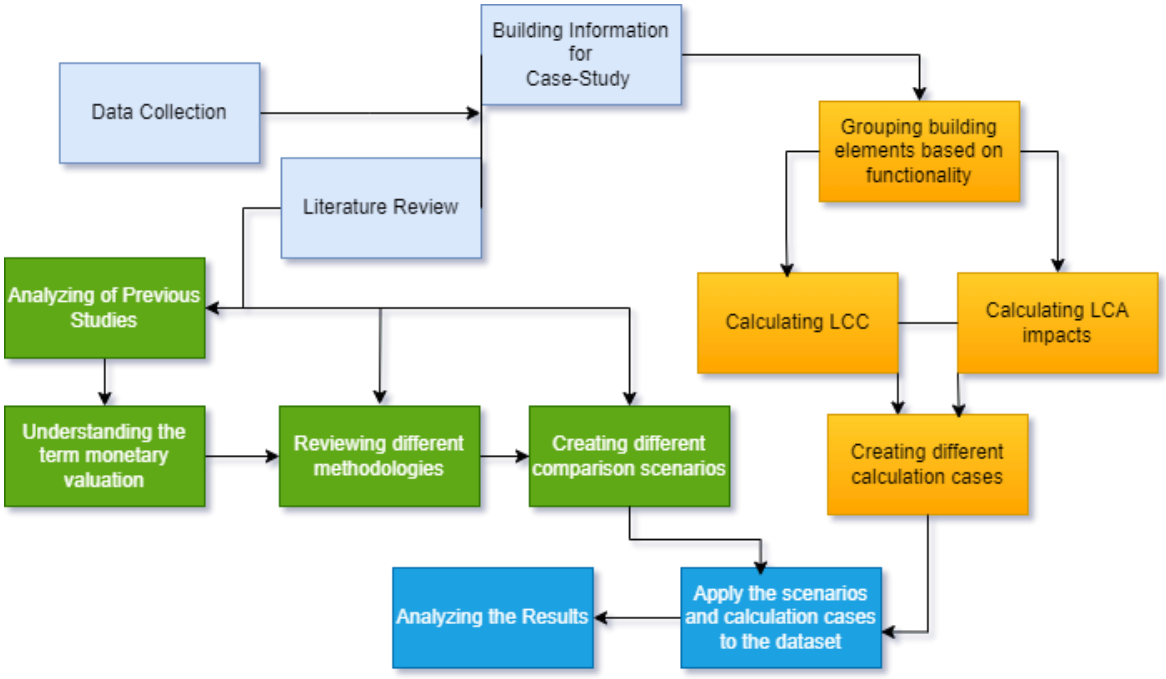

Figure 4 adopted methodology

3.1 Data Collection

The first step in the work approach is data collection, where two types of data are required. The first type is data based on a literature review, while the second type is the data needed to create the case study. The first type of data, research-based data, refers to all previous research on monetary valuation in different contexts and from various origins. Data are collected from multiple sources for the study's second chapter to create the literature review. In the subsequent section 3.2, further details relating to the first data type will be presented. The second data type is all the information gathered to create the case study. The first phase was crucial for gathering all information and data related to the research to use in the different chapters. The final results of the first phase will be reflected and shown clearly in the subsequent parts and sub-sections.

3.1.1 Data Set for the Case Study

First, to execute the case study, it was essential to collect information, such as the type, function, and construction material used to construct several building elements. This step was achieved by using (Meier-Dotzler, 2023) PhD dissertation submitted to the Technical University of Munich chair of Energy Efficient and Sustainable Design and Construction (ENPB).

The thesis has acknowledged the intensity of the current environmental challenges, highlighting how cities negatively impact the environment—emphasizing the need for data and planning tools to compare the ecological quality of different structural development scenarios of residential buildings to be used by planners and decision-makers. In order to achieve the best climate protection and mitigate resource consumption in the construction industry, the tools needed to be used in the planning phase as early as possible. Furthermore, calculation logics, which allow immediate and automated LCA calculation of various development scenarios, are developed to assess the residential building quality in Germany. This was achieved by integrating the calculation logic with the 3D city models (CityGML format, version 2.0, LoD2), providing building information and characteristic values. Finally, to test the applicability of the developed method, it was used on a district level in Munich, Moosach, by using 181 residential buildings. The results could successfully provide recommendations about climate-neutral residential buildings. (Meier-Dotzler, 2023)

The thesis has used the ÖKOBAUDAT Version 2020-II, due to its transparency, to calculate and compare the environmental emissions of different building scenarios, and they are new, old, and renovation scenarios of construction elements of residential buildings in Germany. Moreover, the study has considered the building elements of the following cost groups 320 – 360 according to DIN 276: 2018. To calculate the emissions of different materials, the research has set the functional unit of all building elements to 1 m2 so that different building elements can be compared. In addition, the data set provided, the material combination in each element and its thickness in cm, to calculate the emissions values in ÖKOBAUDAT to compute the environmental emissions of each element. Also, it provided materials' density to determine masses, as some of the datasets used in ÖKOBAUDAT use weight as the reference for the emissions. Finally, for the research case study, the thesis has considered the following LCA stages: A1, A2, A3, B4, C3, C4, and D, while considering only the following LCA factors: GWP, PENRT, PET. Furthermore, the total study period was 50 years. (Meier-Dotzler, 2023)

In the case study for the master's thesis, 108 different building elements were employed, representing the total number of the new building scenario in the PhD thesis as its base. Also, the environmental impacts were further updated to consider additional midpoint impact

categories of LCA based on (*ÖKOBAUDAT*, 2024) In order to investigate their relation to environmental costs and their influence on design decisions.

3.1.2 Study References

Finally, to conduct the study within the German context, it was crucial to choose German references. The following references were the basis of the research: The ÖKOBAUDAT database was used to calculate LCA factors, while the Baupreislexikon was used to provide LCC values for construction materials (Baupreislexikon, 2024; *ÖKOBAUDAT*, 2024). The BNB was used to estimate economic factors and price variation factors (Bewertungssystem Nachhaltiges Bauen (BNB), 2015). Finally, to ensure that the elements are within our research scope, German construction elements, DIN 276, was the base of the type of the elements, as the research case study has considered only cost group 300 structures and finishes in this reference, which refers to the construction.

3.2 Analysis of Previous Studies

The second step in the work approach is the analysis of previous studies. This phase aims, by screening several research studies, to achieve the following: provide an in-depth understanding of monetary valuation, show the approach followed by previous studies to monetize environmental impacts, and highlight the result of different studies of monetary valuation. The outcome of this analysis can be utilized to create the maximum, minimum, and mean scenarios to be used in the data analysis in chapter four.

3.2.1 Methodology of Literature Review

First, a selective literature review on monetary valuation was performed. The search was neither limited to the German market nor the construction sector. However, to fulfill the objectives of this research, there was a focus on the monetary valuation of environmental factors in the context of European and, more specifically, German building design. During the search, the following keywords were used: environmental cost, monetary valuation, and LCA & LCC.

Subsequently, a comprehensive literature search on the methodologies executed by the previous studies was conducted to clearly understand each research's methodology and outcome. This could be achieved by focusing on the following key questions:

- What are the current methods and frameworks for monetizing environmental factors in building design?
- How are the monetary factors of different studies compared and leveraged to support decisions in the building design process?

This part was necessary for developing the case study to know which factors can influence monetary valuation methods and which aspects should be considered when creating the case study to get the best outcome. Moreover, it was essential to answer the research questions and achieve its objectives. The results of this step are extensively demonstrated in chapters 2 and 4.

3.2.2 Scenarios Development

In order to develop the research's case study, different scenarios were used to calculate the environmental cost of construction materials by monetizing the environmental factors of LCA. This step showed how varying environmental costs can influence the choice of the most environmentally friendly and cost-efficient construction materials for different building elements. This study created three scenarios, maximum, minimum, and mean, to demonstrate the influence of environmental costs within a wide range in selecting the most cost-efficient building element. The monetary values, which are the basis of the case study, have been collected from previous studies and references and can be shown in Table 11, where the monetary values for the maximum and minimum scenarios are highlighted. The table contains the monetary factors for the following impact categories: (GWP) global warming potential, (ODP) ozone depletion potential, (AP) acidification potential, (EP) eutrophication potential, (POCP) Photochemical oxidation, (ADPE) abiotic depletion potential non-fossil resources.

Furthermore, Table 11 originated from Table 9. However, it has been slightly modified. The monetary value of GWP from the Stern review has been removed as the study was not developed by Germany or even an EU country, and it introduced only monetary factors for the GWP and ignored other impact categories. The reliability of considering only GWP and its contribution to the total environmental costs will be investigated in section 4.3. the Methodological Convention for the Determination of Environmental Costs has replaced the study, as it considers in its calculation GWP and AP monetary factors, which are relevant to the scope of the study to measure the macroeconomic significance of the environmental costs (Matthey & Bünge, 2020). Also, the values from the method Ecovalue08 have been ignored, as Ecovalue12, which is the update of Ecovalue08, has been seen to be sufficient.

3.2.2.1 Maximum Scenario

The first scenario is the maximum scenario, where the aim is to calculate the maximum environmental costs by using the maximum monetary values from Table 11 monetary values. The table highlights the maximum values with a blue color to differentiate them from others. However, the economic values are constant in all scenarios across the same calculation cases because the main aim of creating different studies is to observe the influence of different monetary values developed and used by the previous studies.

3.2.2.2 Minimum Scenario

The second scenario is the minimum scenario, where the aim is to determine if calculating the environmental costs using the least possible combination of monetary values developed in the previous studies from Table 11 monetary values could still influence the design decision. The minimum values are highlighted in green on the table. Following the same procedures from the maximum scenarios, the results from the minimum scenario will be introduced and discussed in the fourth chapter.

Table 11 monetary values

Method/ Reference	**GWP** €/kg CO2	**ODP** €/kg R11	**AP** €/kg SO2	**EP** €/kg PO4	**POCP** €/kg Ethen	**ADPE** €/kg Sb
EPS 2020d (1)	0.29	-	0.004	0.04	-	26,200.00
MMG (2017) (2) (Western European)	0.20	100.00	0.88	60.00	6.60	6.23
Ecovalue12 (3)	0.49	-	2.63	58.77	3.51	-
ECO2 (4)	0.650	90.91	14.71	20.74	9.59	17,232.63
Ecotax2 (5)	0.06	105.26	1.58	2.51	4.21	-
Methodenkonvention 3.1 (6)	0.68	-	15.80	-	-	-

(Steen et al., 2020) (1), (Wille, 2018) (2), (Finnveden et al., 2013) (3), (Schneider-Marin & Lang, 2022) (4), (Ahlroth & Finnveden, 2011) (5)& (Matthey & Bünge, 2020) (6)

3.2.2.3 Mean Scenario

This scenario will consider the mean value of the monetary values of the environmental emissions calculated from Table 11 monetary values. The aim is to give a complete picture of the data alongside the maximum and minimum and determine if the mean value of the monetary factors acquired from the previous studies in section 2.3, to calculate the environmental costs can still affect the design decision despite the difference in the work approach followed by the previous studies. Moreover, this can result in a more comprehensible analysis of the monetary valuation and the influence of the environmental costs on decision-making. The values used in creating this scenario are shown in Table 12.

Table 12 The mean monetary values

GWP €/kg CO2	**ODP** €/kg R11	**AP** €/kg SO2	**EP** €/kg PO4	**POCP** €/kg Ethen	**ADPE** €/kg Sb
0.40	98.72	5.93	28.41	6.00	14,479.62

3.3 Case Study Data Preparation

The third step was the preparation of the case study. This part was built on section 3.1 after choosing the appropriate reference and dataset. This was essential for the execution of the case study by achieving the following: grouping of similar building elements in one group, calculating the LCC values of each element, calculating the emissions exerted by impact category within the study scope for each element, and creating the calculation cases to account for the future values of the environmental costs.

3.3.1 Grouping of Building Elements

The first step after acquiring the data for the case study is to group every comparable element based on functionality. The function unit was the surface area, which was set to 1 m2, which means that the emissions and costs of 1 m2 of each building element will be compared. The data contain information about the materials used to construct the building elements in the research's case study. The total number of building elements is 108, and they are grouped into 25 groups, each containing at least two comparable building elements. Table 13 shows the

grouped elements used to conduct this study, where each building element comprises several materials. More detailed information about the construction materials used to create each building element is presented in the appendix in Table 15.

Table 13 list of elements

Group Number	Group Reference	Description
1	PRO_h	Steep-pitched roof heated
2	PRO_uh	Steep-pitched roof unheated
3	FRO_mas	Flat roof massive
4	FRO_wood	Flat roof wood
5	EW_mas	Exterior wall massive
6	EW_wood	Exterior wall wood
7	SW_mas	Partition wall massive
8	SW_wood	Partition wall wood
9	IW_mas	Interior wall massive
10	IW_wood	Interior wall wood
11	CW_h	Basement outer wall heated
12	CW_uh	Basement outer wall unheated
13	SCW_h	Basement partition wall heated

14	SCW_uh	Basement partition wall unheated
15	FL_mas	Ceiling massive
16	FL_wood	Ceiling wood
17	TFL_mas	Top floor ceiling massive
18	TFL_wood	Top floor ceiling wood
19	CFL_mas	Basement ceiling massive
20	CFL_wood	Basement ceiling wood
21	BP_h	Floor slab heated
22	BP_uh	Floor slab unheated
23	W_alu	Window aluminum
24	W_plas	Window plastic
25	W_wood	Window wood

3.3.2 LCA for Building Elements

Afterward, LCA was calculated for each building element by calculating the emissions of every construction material. The total study period for the building elements is 50 years. The study has considered the following impact categories: GWP, OD, AP, EP fresh water, POCP, and ADEP. The midpoint impact categories were chosen based on those mentioned by the previous studies in Table 9 and relevant to the LCA impact categories calculated by ÖKOBAUDAT (ÖKOBAUDAT, 2024). The integration between the outcome of the previous studies and ÖKOBAUDAT was essential to conduct the study within the German context, as ÖKOBAUDAT was used as the most common reference to calculate the emissions. Moreover, this results in considering only the following phases: A1-A3, B4, C3, and C4, representing the

following stages: product, use, and end-of-life. Unfortunately, some materials were also missing information about the emissions exerted in the end-of-life stages C3 and C4. The emissions exerted during the product stage, use stage, and end-of-life stage are to be used in the calculation of the environmental costs in the fourth chapter. For the calculation of the emissions exerted by each material, the same approach followed by (Meier-Dotzler, 2023) was used. The thickness in meters of each material was multiplied by the emission from ÖKOBAUDAT, where volume is the reference unit. In other materials, where the weight (kg) is the reference unit, the final value is multiplied by the density of the material. Finally, when the reference unit was the area, the emissions were multiplied by the thickness in meters and the density, and then the values were divided by the weight of the referenced material**.**

3.3.3 LCC for Building Elements

Finally, LCC was calculated for each building element using the values from an ongoing project, which is financed by the Federal Ministry for Economic Affairs and Climate Action: BMWK, and respected institutions such as the Technical University of Munich and Technical University of Stuttgart (Schröter et al., 2024), while having Baupreislexikon (Baupreislexikon, 2024) as the main reference for the calculations. Following the same approach used in calculating the LCA, the LCC will consider the total life of the building, Reference Study Period (RSP), to be 50 years. The following phases were considered in the calculations: construction cost, operational cost, and demolition and disposal cost, which can be reflected in the product stage, use stage, and end-of-life stage in LCA. The LCC is consistent with the LCA and may be present similarly, as shown in Figure 5. LCC calculations were performed to illustrate the ranking of various building elements in terms of cost-efficiency, both with and without factoring in environmental costs. This analysis aims to highlight the impact of considering environmental costs on the comparative ranking of these elements.

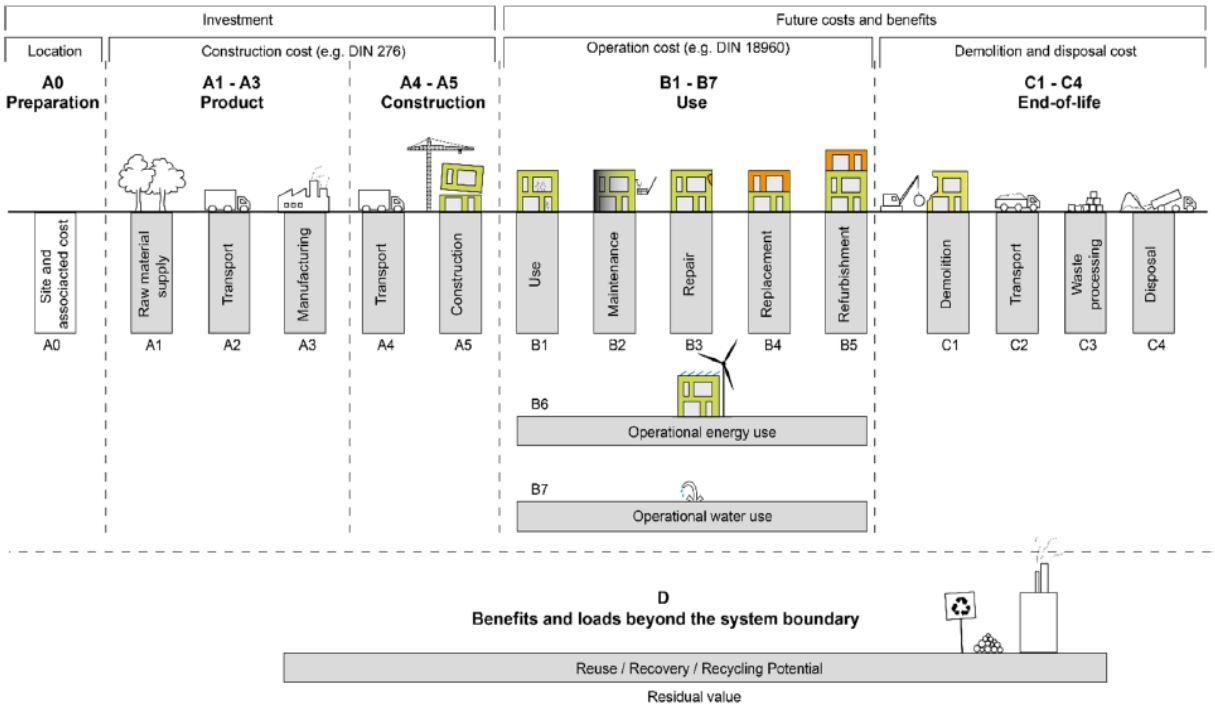

Figure 5 LCC and LCA phases (Schneider-Marin et al., 2022)

3.3.4 Calculation cases

In addition, to deal with future uncertainties associated with long-term environmental impacts and emissions fluctuation, four different calculation cases are introduced within each scenario to calculate the environmental costs. The following economic factors are to be considered: the yearly price increase and discount factor. The yearly price increase refers to the annual increase in materials or services prices (Bewertungssystem Nachhaltiges Bauen (BNB), 2015). In the research context, it refers to an annual increase in emissions, which means that the emission values will increase yearly by 2%. Moreover, the discount rate is used to calculate the time value of money and is based on different criteria such as opportunity cost, inflation, and others (Fregonara & Ferrando, 2023). Therefore, the 1.5% discount rate means the value will reduce annually for the total study period by 1.5%. The standard values for the economic factors are derived from the BNB, where the value of the price increase is set to be used for the building materials. However, it will be used with the emissions in this research (Bewertungssystem Nachhaltiges Bauen (BNB), 2015). Table 14 below summarizes the economic factors used to calculate the environmental costs.

Table 14 Economic parameters

Yeary price increase	2%

Discount rate	1.5%

However, there are countless arguments against discounting environmental emissions as it can indicate that the current generation is worth more than the future generations (Tekie & Lindblad, 2013). Hence, it is only applied for two of the calculation cases seen later rather than being used as a standard approach in the environmental costs' calculations. However, discounting the future emissions has been justified in previous studies by claiming that the fluctuating concentrations of pollutants in the atmosphere can lead to changes in emissions, which in turn affect the environment (Schneider-Marin & Lang, 2022).

There are four different cases for environmental cost calculations in each scenario. The first case does not consider the additional environmental factors. The subsequent three cases considered the economic factors for 50 years, the total study period. In the second case, only the yearly price increase was considered in the calculations, while the discount rate was considered in the third case. In the final case, the annual price increase factor, as well as the discount rate, were presented in the calculations. The equation used to calculate the future environmental costs was:

$$FV = PV \times (1 + r)^{\pm t}$$

"FV" denotes the future value and represents the year "t" cost. "PV" stands for the price in the base year. The interest rate is denoted by "r;" in this research, it can represent the actual discount rate and the factor of the yearly price increase. Finally," $\pm t$," is the number of years between the base year and the cost occurrence. The value is negative only when the environmental costs are discounted in the third case. Otherwise, "+ t," was utilized for the other two cases.

3.4 Analysis Approach

The fourth and last step is to apply the outcome of the second and third steps to the dataset from step one. The results will be analyzed and interpreted by the following means: first, building elements in the same groups will be compared and ranked according to their total cost per m2 to demonstrate the contribution of environmental costs in the ranking process. Second, the building elements will be compared to each other to find which building element has the highest environmental costs. The third step will demonstrate the contribution of each impact category to the final environmental costs. Finally, the CO2 price will be compared with the environmental costs from all scenarios to ascertain its representativeness.

4 Results and Discussion

The fourth chapter of this research is about the results. This chapter presents the analysis outcomes conducted under the proposed methodology workflow. The analysis is introduced as follows: first, the environmental costs will be calculated using the maximum monetary values retrieved from Table 11, followed by the calculation using minimum monetary values from Table 11 as well. The mean value of the environmental cost will be calculated using the monetary values retrieved from Table 12. The results of the three scenarios will be presented in a tabular format. Textual discussions, graphs, or both will be provided to communicate the results in each scenario and to highlight the influence of environmental costs on the ranking of the building elements of the same group.

Subsequently, a comparative analysis of the different building elements will be performed to identify the building element type with the highest environmental cost among all groups. Moreover, the contribution of the environmental costs to each building element's total price will also be illustrated. Afterward, in addition to the main table, graphs will be utilized to visualize the contribution of different mid-point impact categories, represented by each building element, to the final environmental costs in each scenario. This will aid in determining the primary impact category driving the environmental costs and its associated percentage.

Furthermore, the CO2 surcharge proposed and used by the German government will be compared to the total environmental costs from all three scenarios respectively to determine if this price is sufficient to represent the environmental damage caused by the building elements and to determine which measures must be taken. The comparison will include only the first calculation case in the three scenarios, as the economic impacts will not be a part of it. The reason for this is that the CO2 price in Germany will increase in the following years to reach 55 cents, and there will be a complete change in the CO2 price regulations starting from 2027 (Die Bundesregierung, 2024). This makes it impossible to predict or assume the actual CO2 price in the future. Therefore, the comparison ignores the economic factors and assumes that the prices will be constant for the whole study period.

Finally, the chapter ends with a summary of the achievements and a discussion of the principal findings. This will involve a detailed presentation of the key observations from each of the previously mentioned sections. In order to provide a more comprehensible explanation of the analysis results

4.1 Environmental Costs Influence on Total Price with LCC

The maximum values of the environmental costs are presented in Table 16, which shows the total price of the building elements per m2 after considering the environmental costs for all groups and the variation of environmental costs due to the different economic factors in other rows of the building element. Also, the table shows the proportion of each midpoint impact category to the total environmental costs. Subsequently, the second and third scenarios, minimum and mean scenarios, will be presented respectively in Table 17 and Table 18, which will ultimately be the same as Table 16, except that they will show the minimum and mean values of the environmental costs. In the following pages, building elements with equal or insignificant variation in LCC values within each group will be highlighted to show the potential influence of monetizing the environmental impacts on selecting the most cost-efficient building elements of comparable cost and functionality. The influence of environmental costs on the ranking process will also be highlighted.

In the first group, PRO_h, the environmental costs do not change the ranking of the building element in the maximum and mean scenarios, as the building element with the higher LCC is the one with the higher environmental costs. However, the results are different in the second scenario, as seen in Figure 6. The figure illustrates all calculation cases of the group's building elements, where 1-1 represents calculation case one of the first element PRO_h_1, while 2-1 represents calculation case two of the second building element PRO_h_2. The values of the environmental costs are remarkably lower than in the first and mean scenarios. In this scenario, PRO_h_1 has a higher total price in the first, third, and fourth calculation cases, similar to the other scenarios. However, in the second case, where the 2% future price variation for the building materials is considered, PRO_h_2 has a higher total price because of the higher environmental costs. This can be due to the higher environmental costs of wood fiberboard compared to cellulose fiber-blowing insulation material, especially in phase C.

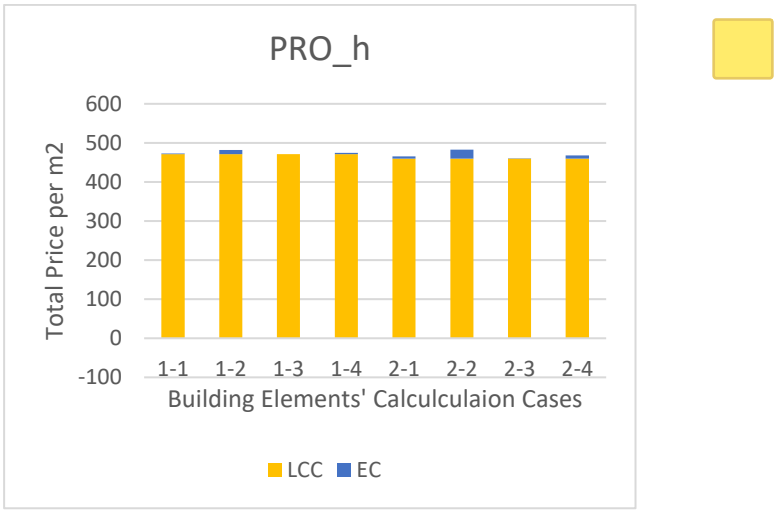

Figure 6 PRO_h min scenario

In the second and third groups, PRO_uh and FRO_mas, the building element with lower LCC has lower environmental costs and total price in the different scenarios and all four calculation cases. Using stainless steel sheets PRO_uh_1 provides lower environmental costs than the roof tiles in PRO_uh_1. Also, in FRO_mas_1, reinforced concrete C20/25 with 1% steel has lower LCC and environmental costs than reinforced concrete C30/37 with 2% steel in FRO_mas_2.

In the fourth group, FRO_wood, building elements are ranked from the highest to the lowest based primarily on the LCC for the four building elements, as the element with lower LCC has a lower total price regardless of the environmental costs among all scenarios and across in all calculation cases, except for the third case in the maximum scenario, as observed in Figure 7 in the comparison between 4-3 and 1-3, FRO_wood_4 became the second-best option after FRO_wood_3 in the third calculation case, based on the total price per m2. The high environmental costs of FRO_wood_1 compared to FRO_wood_4 are attributed to the high environmental costs of the ADPE emission from damp insulation production. Moreover, the environmental costs in case three demonstrate negative values in FRO_wood_4. This is due to the high negative values associated with wood-based materials during production stages. The positive values from stages B and C typically cover the negative values. However, when the values are discounted, the negative values outweigh the positive ones. Finally, FRO_wood_1 has the lowest LCC and environmental costs. The low environmental cost is due to the absence of materials, such as wood fiberboard and damp insulation. Also, the thickness of cross-laminated timber is half that of FRO_wood_4.

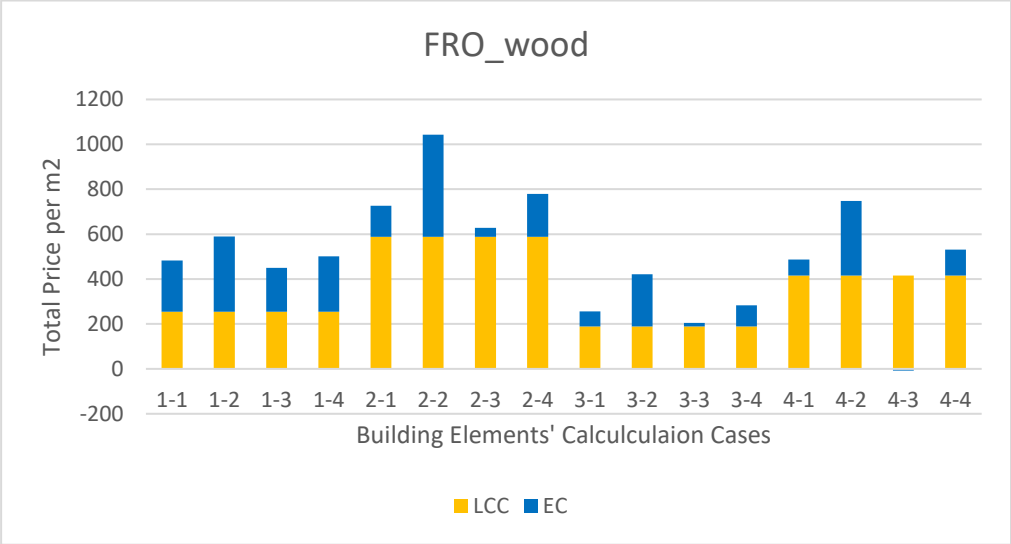

Figure 7 FRO_wood max scenario

In the fifth group, EW_mas, the environmental costs play a more significant role in ranking the building materials in the maximum scenario compared to the previous group, as shown in Figure 8. An interesting observation is the comparison between EW_mas_2 and EW_mas_4 building elements. Despite the minor difference in LCC and environmental costs, in the second case, the environmental costs in building element four increased and became equivalent to 1.5 times more than the environmental costs in building element two. This is demonstrated as 2-2 and 4-2. This considerable difference is due to using 26.22 cm thick wood fiber insulation boards in EW_mas_4. This material has high GWP emissions in phase C. Finally, the results from EW_mas_1 and the EW_mas_7 elements are observed. The first building element has a higher LCC and total price per m2 in all cases, except for the second case, where the seventh has a higher total price due to the higher environmental costs and the 2% price increase. EW_mas_3 and EW_mas_5 have the lowest total price in the first calculation case in this group. However, compared to EW_mas_1, they have a higher total price in the second case.

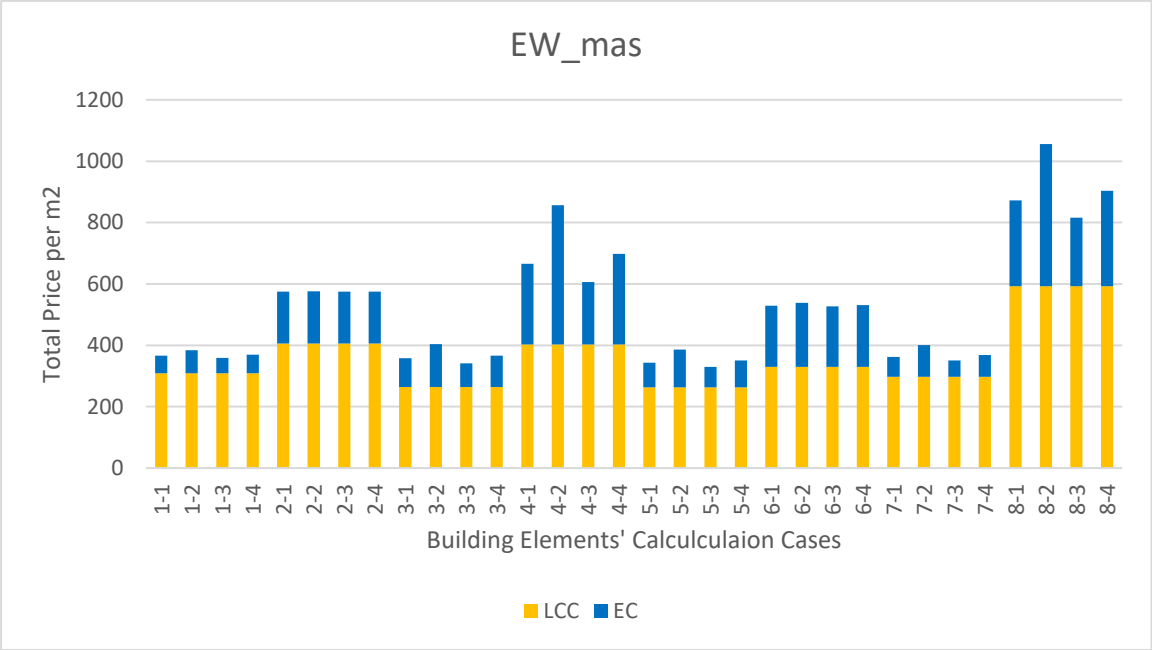

Figure 8 EW_mas max scenario

In the minimum scenarios, the building elements are mostly ranked based on the LCC values except for the second and fourth building elements. The difference in LCC is negligible, but they are apparent in the overall price, as EW_mas_4 has only a higher total price in the second and fourth cases and a lower total price among all other calculation cases, as demonstrated in Figure 9.

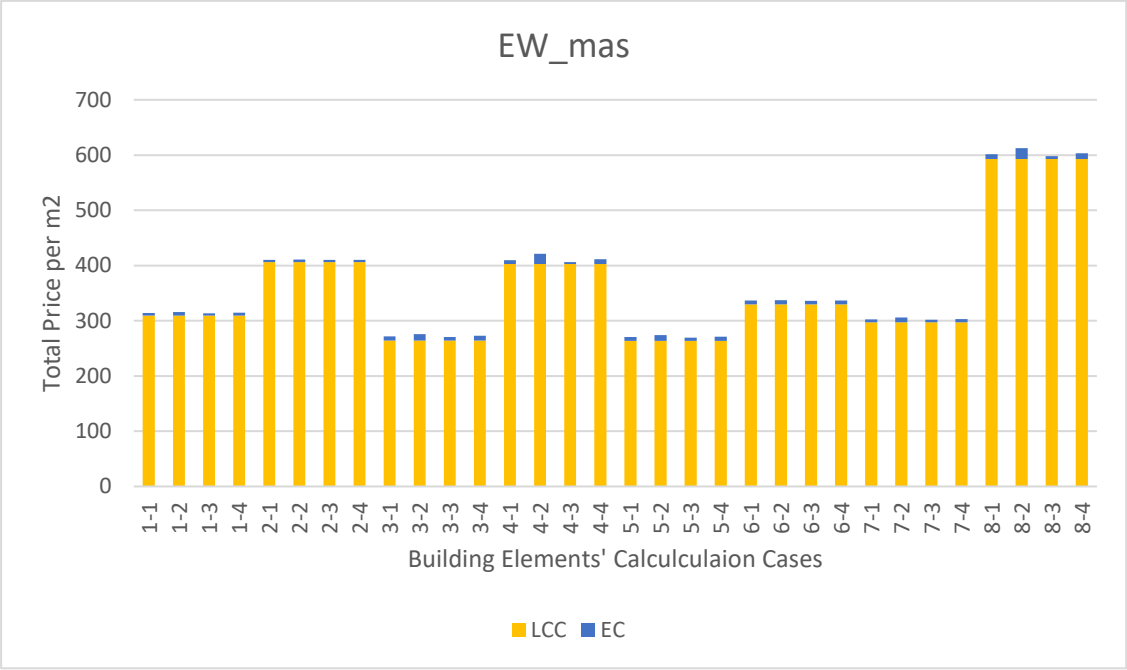

Figure 9 EW_mas min scenario

In the final scenario in group EW_mas, the mean scenario and the ranking of the building elements can be seen in Figure 10. Starting with EW_mas_2 and EW_mas_4, the outcome is similar to that in the maximum scenario as well. Furthermore, the results from EW_mas_1 and EW_mas_7 are a bit different from the maximum scenario. The first building element has a higher LCC and total price per m2 in only the third calculation case.

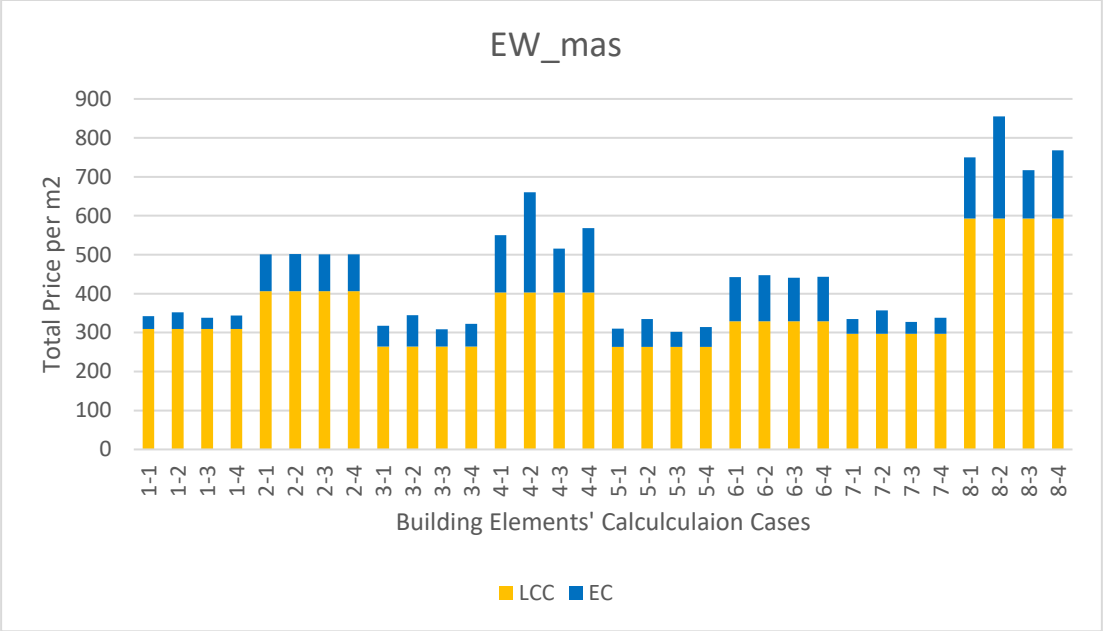

Figure 10 EW_mas mean scenario

In the sixth group, EW_wood, the environmental prices play a determinant role in ranking the most cost-efficient building element in the maximum scenario, as demonstrated in Figure 11. EW_wood_1, which has the lowest LCC in this group, has a higher total price in all calculation cases than EW_wood_3 because of the significant difference in the environmental costs. This considerable difference in value is due to the use of under-roof membrane-reinforced PE fabric and damp insulation, which have high environmental costs that stem from ADPE emission and its high monetary value.

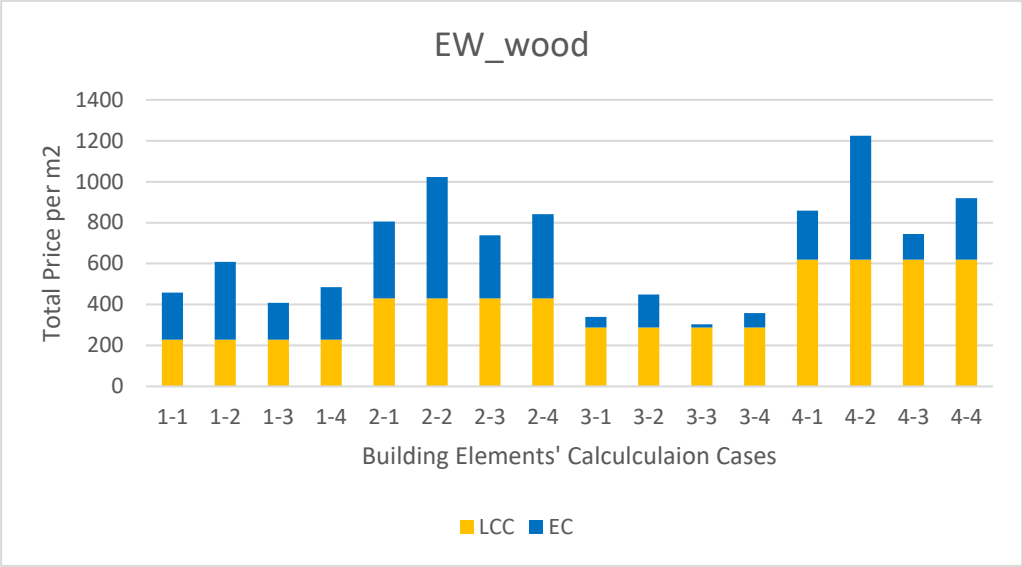

Figure 11 EW_wood max scenario

EW_wood, building elements are ranked from maximum to minimum total cost per m2 based only on the LCC in the four calculation cases of the minimum scenario, where the environmental costs do not play any role in the ranking process in this group.

Finally, in the mean scenario of EW_wood, building elements, the results of the comparison between EW_wood_1 and EW_wood_3 are the same as the maximum scenario, despite the difference in environmental cost values, as demonstrated in Figure 12.

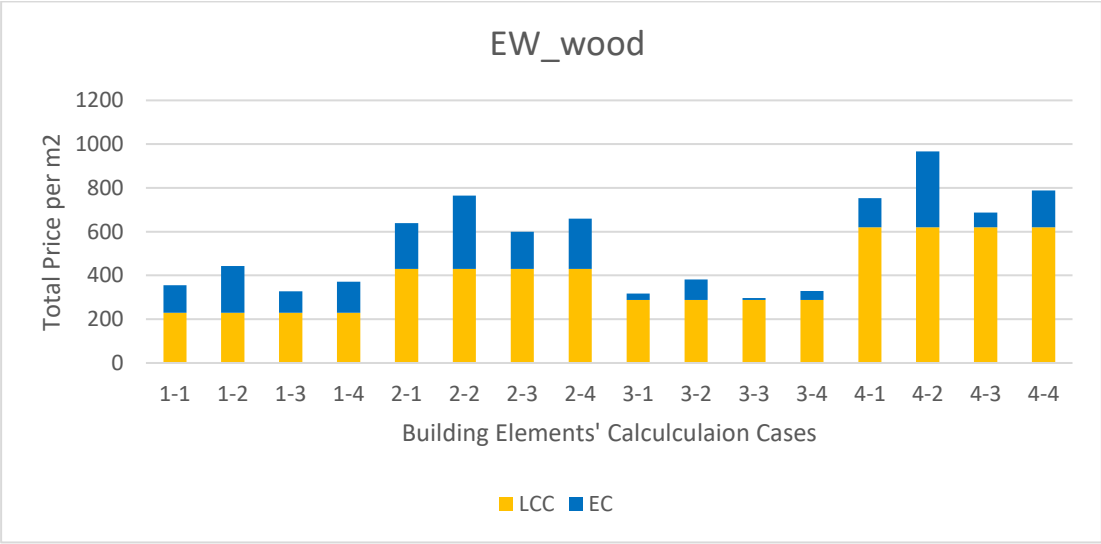

Figure 12 EW_wood mean scenario

In the seventh group, SW_mas, the environmental costs influence the ranking of four building materials in the maximum scenario, as illustrated in Figure 13. Building elements SW_mas_4 and SW_mas_6 have lower LCC than building elements SW_mas_7 and SW_mas_8, respectively. However, they have considerably higher environmental costs. This results in the

elements with the lower LCC being the ones with higher total prices due to the difference in environmental costs. This outcome can be attributed to the utilization of a larger volume of sand-lime brick and aerated concrete in comparison to reinforced concrete. Finally, SW_mas_3 has the lowest total LCC and environmental costs. The low environmental cost values are attributed to the calcium silicate bricks with only 0.8% cement, which tend to be the one with the lowest thickness in this group.

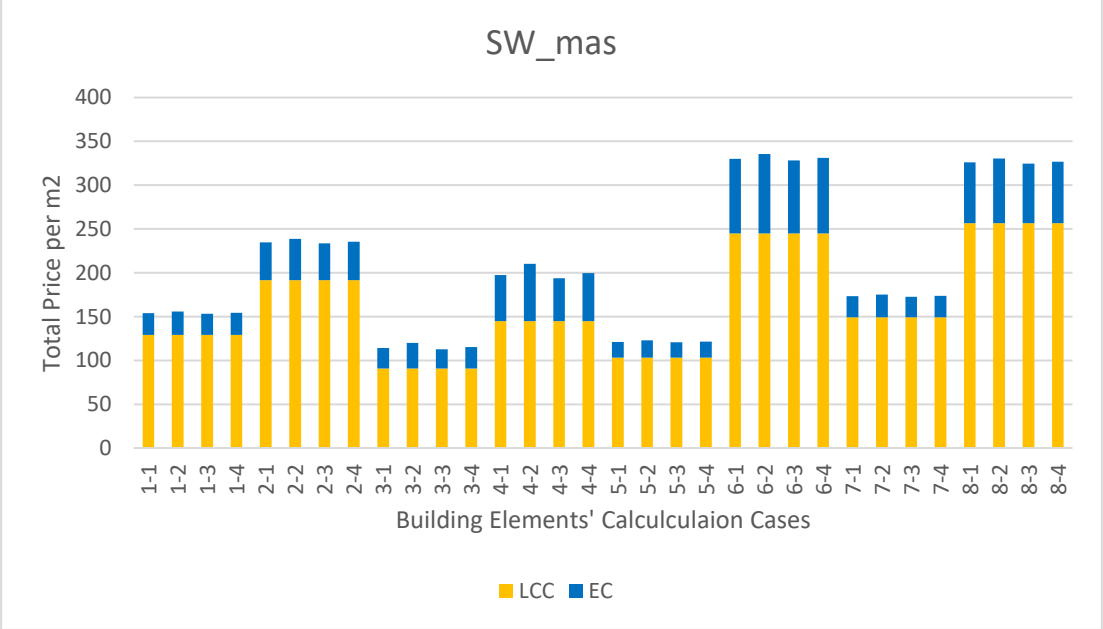

Figure 13 SW_mas max scenario

In the minimum scenario, the outcome of the results is much different from the first scenario, as the environmental costs do not play any role in the ranking process of building elements due to their low values. The elements of this group are ranked from most to least cost-efficient based only on the LCC values.

In the third scenario, the mean scenario, the outcome aligns with the maximum scenario in the comparison between SW_mas_4 and SW_mas_7. SW_mas_4 yields a higher total price than SW_mas_7 in all calculation cases, as seen in Figure 14. Also, the difference in total price in this scenario is less significant compared to the first scenario due to the lower values of the environmental costs.

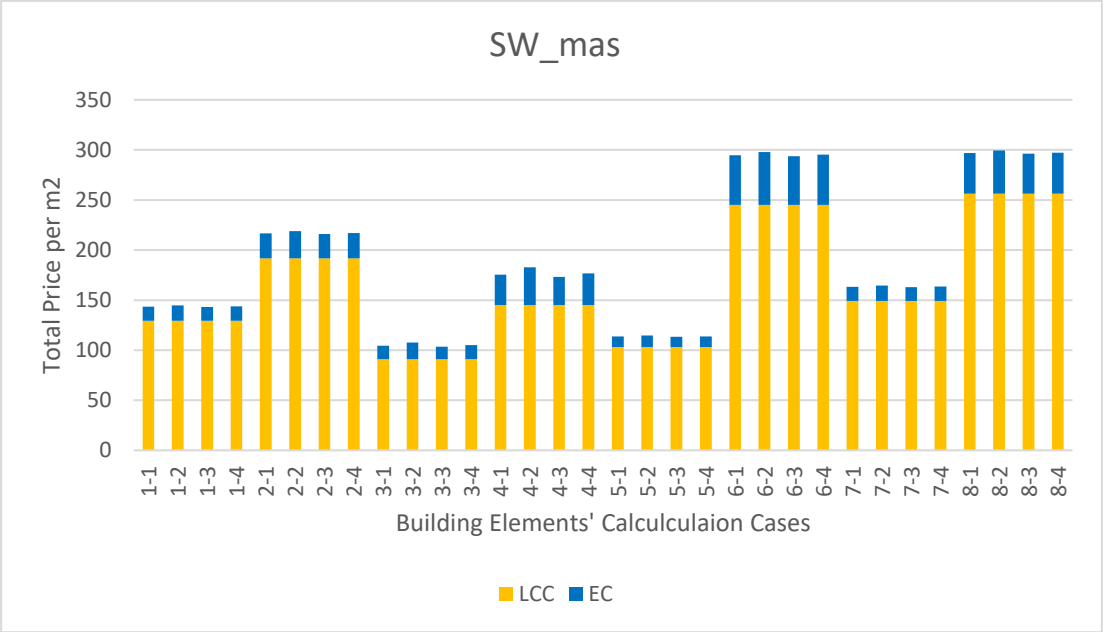

Figure 14 SW_mas mean scenario

In the eighth group, SW_wood, building elements are ranked from maximum to minimum total cost per m2 in the four cases and all scenarios based on the LCC, where the environmental costs do not influence the ranking for these building elements in this group differently. SW_wood_1 has the lowest LCC and environmental costs because it is built of materials such as cellulose fiber-blowing insulation material.

The maximum scenario in the ninth group, IW_mas, has an outcome similar to the maximum scenario in the seventh group, as illustrated in Figure 15. Building elements one, two, five, and six are compared in this scenario. Starting with IW_mas _1 and IW_mas_5. Despite the difference in LCC values, the total price per m2 is the same on both sides, with a variation of only a few cents. Regarding building elements IW_mas _2 and IW_mas _6, the second building element has higher LCC values. However, the sixth building element has a higher total price per m2 in all calculation cases due to the higher environmental costs. This is because of the higher environmental costs of calcium silicate bricks used in this element compared to the Brick (filled with insulating material). Finally, IW_mas_3 has the lowest total LCC and environmental costs. The low environmental cost values are attributed to the calcium silicate bricks with only 0.8% cement, which tend to be the one with the lowest thickness in this group. This demonstrates how the difference in materials' thickness can considerably influence the ranking of the most cost-efficient building element.

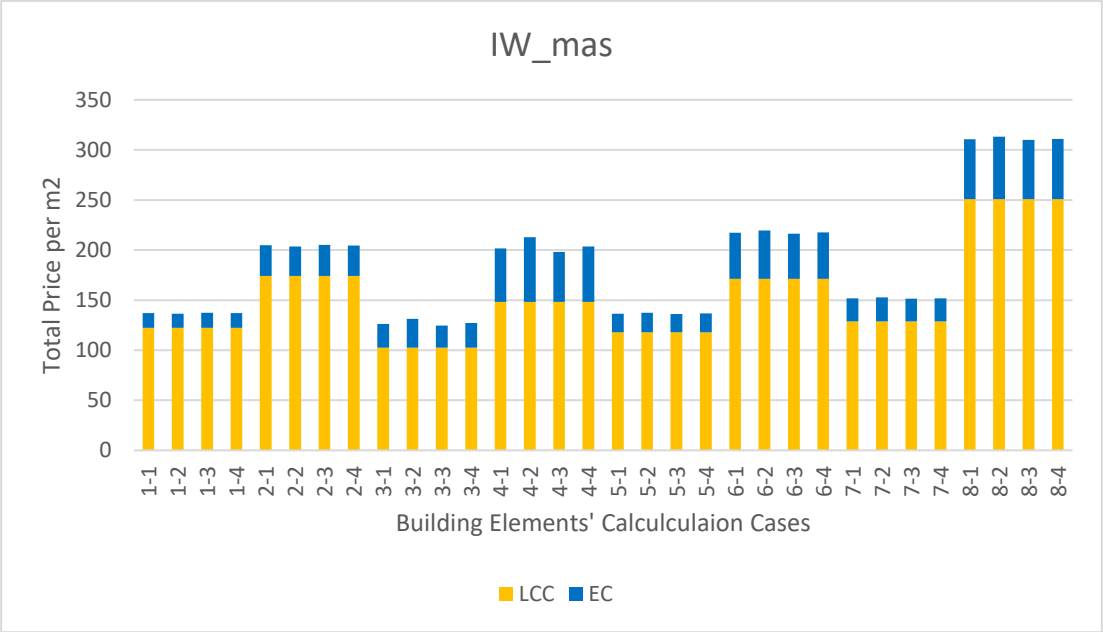

Figure 15 IW_mas max scenario

Once more, the second scenario, the minimum scenario, has a different outcome from the first scenario, as the building elements are ranked based on the LCC. In contrast, environmental prices do not influence the total price ranking differently.

Figure 16 shows the ranking of the building elements according to the total price per m2 in the mean scenario. Even though the outcome of the comparison between IW_mas _2 and IW_mas _6 is similar to those in the first scenario, the value difference in the total price per m2 is much less.

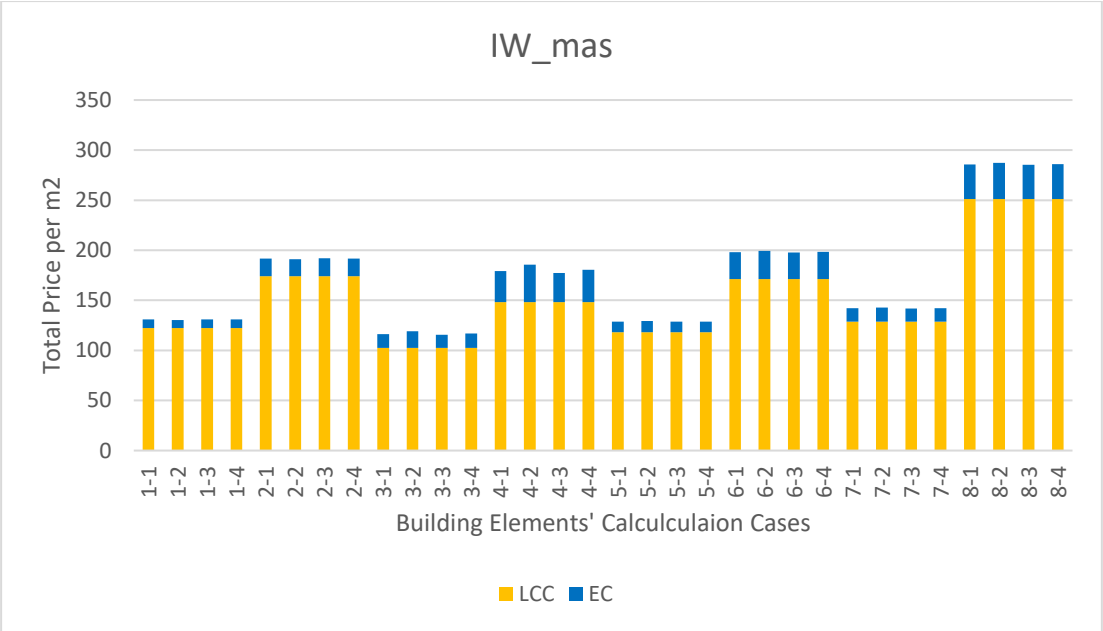

Figure 16 IW_mas mean scenario

The tenth group, IW_wood, exhibits a similar trend to the eighth group, SW_wood, where the most to least cost-efficient building elements are ranked based on the LCC values. Moreover, these values are directly proportional to the environmental costs within this group, which means that the higher the LCC values, the higher the environmental costs of the building elements. IW_wood_1 has the lowest LCC and environmental costs because it is built of materials such as cellulose fiber-blowing insulation material.

In the eleventh group, CW_h, the environmental costs play a significant role in positioning the building elements from most to least cost-efficient in the maximum scenario, as demonstrated in Figure 17. CW_h_1's comparison with CW_h_2 illustrates the role of environmental costs. Although the LCC value difference between them is negligible, CW_h_2 has a clear total price difference between all four calculation cases. This example shows the significant intensity of the environmental costs. Another interesting observation is shown in the comparison between CW_h_4 and CW_h_8. Although CW_h_8. has a higher LCC value, CW_h_4 exhibits a higher total cost in all calculation cases, demonstrated on the graph as 4-2 and 8-2. This is due to the high values of phases B and C of the Extruded polystyrene. Finally, comparing CW_h_3 with CW_h_1, CW_h_5, and CW_h_6, it is noticed that the third element, with obviously lower LCC and total cost values, could have a noticeably higher total cost in the second calculation case. Also, in the first calculation case, it has a higher total price than CW_h_5 as well as a higher total price in the fourth calculation case than CW_h_1, CW_h_5. The high environmental cost values are attributed to Extruded polystyrene, which has high environmental costs in all A, B, and C phases.

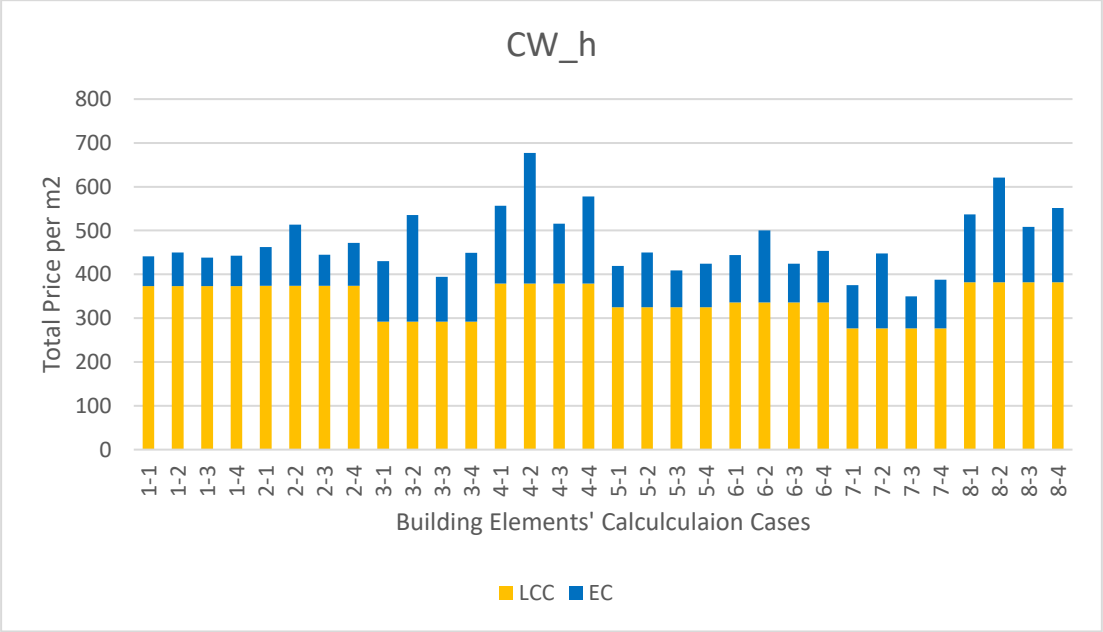

Figure 17 CW_h max scenario

In the minimum scenario, the influence of the environmental costs is much less, as shown in Figure 18. Nevertheless, the conclusions drawn from the first comparison between CW_h_1 and CW_h_2 performed in the maximum scenario stay the same, as there was no change in the final outcome. Regarding the comparison between CW_h_4 and CW_h_8, the outcome differs from the first scenario, as CW_h_4 has only a slightly higher total price in the second calculation case.

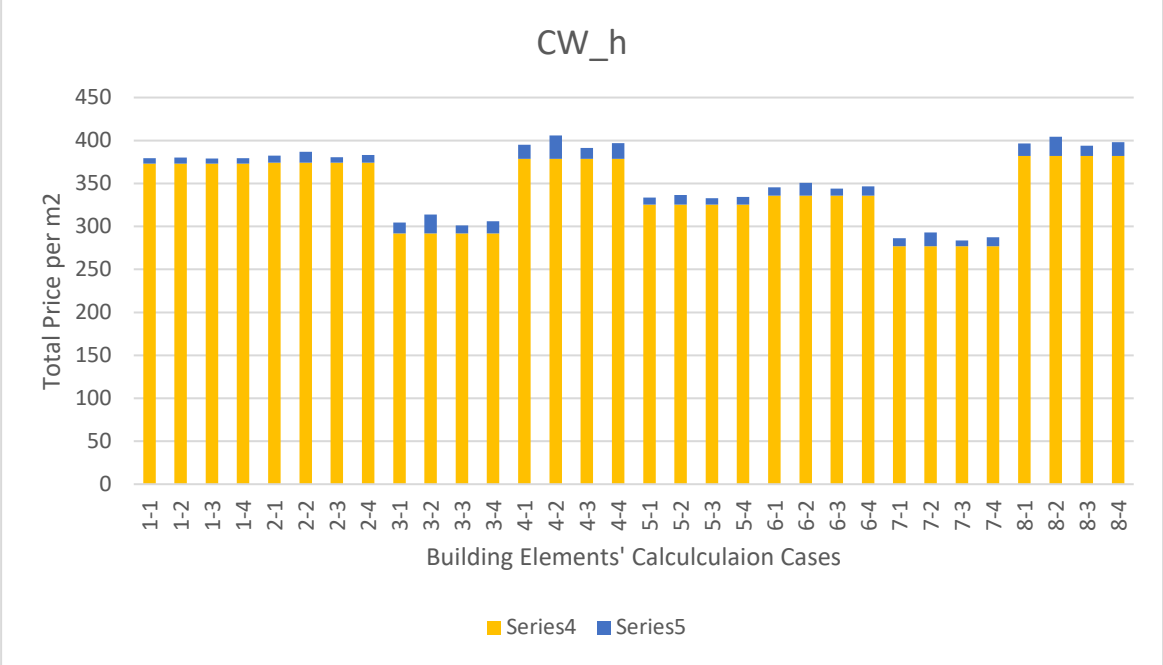

Figure 18 CW_h min scenario

Finally, the mean scenario's outcome is a mix of the outcome of the previous scenarios, as seen in Figure 19. This can be demonstrated in the first comparison between CW_h_1 and CW_h_2 and CW_h_4 and CW_h_8, where the outcome is exactly the same as the maximum scenario. Another interesting observation is the comparison between CW_h_3, CW_h_1, and CW_h_5, where CW_h_3 has the lowest LCC and a lower total cost per m2 among all calculation cases except for the second calculation case.

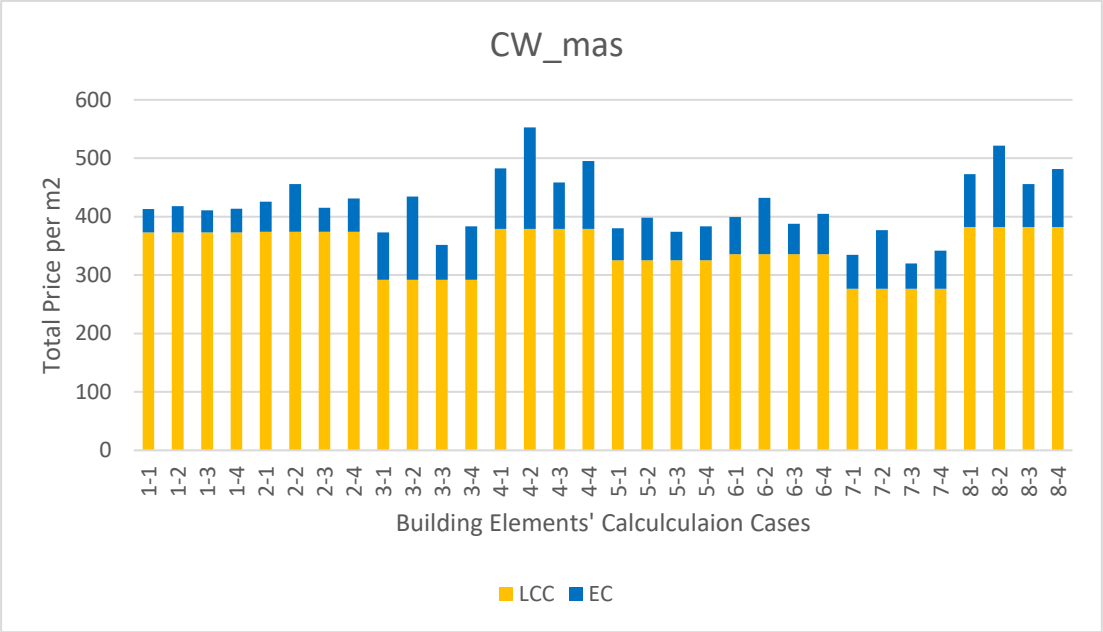

Figure 19 CW_h mean scenario

In the twelfth group CW_uh, the environmental costs do not impact the ranking of the most cost-efficient building elements, based on the total price per m2, in all scenarios and calculation cases except for CW_uh_4, CW_uh_5, and CW_uh_8 in the second calculation case of the maximum scenario, as shown in Figure 20 in 4-2, 5-2, and 8-2. While CW_uh_4 demonstrates the lowest LCC and total price, it has a higher total price in the second calculation case. Similarly, CW_uh_5 shows a lower LCC and total price across all calculation cases except for the second calculation case in comparison to CW_uh_8. CW_uh_4 also has a higher total price in the first and fourth calculation cases. This is because of the 36.5 cm thick calcium silicate bricks building materials in CW_uh_4.

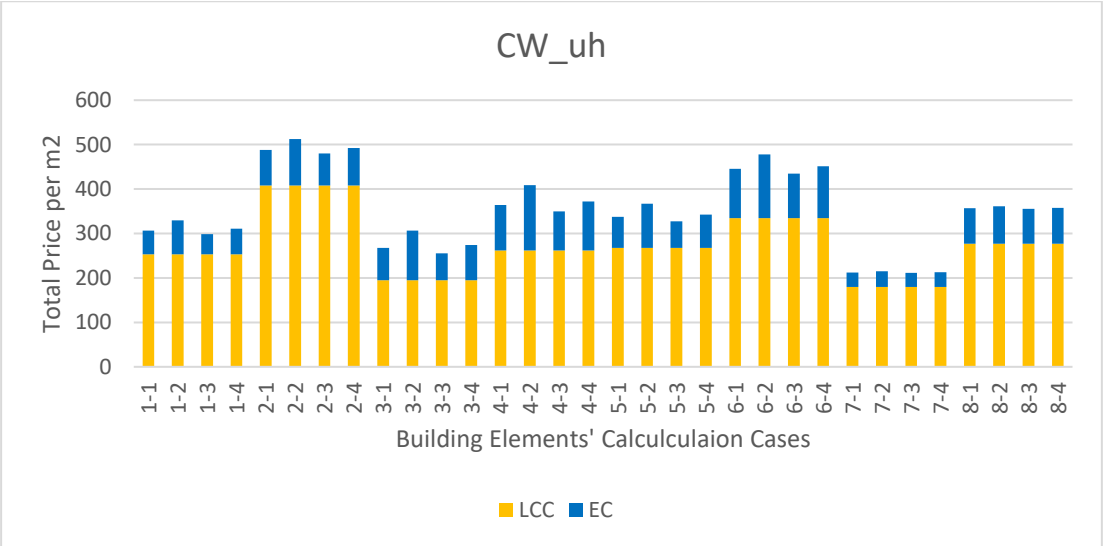

Figure 20 CW_uh max scenario

In the thirteenth group, SCW_h influences the ranking of the following building elements: SCW_h_1, SCW_h_2, SCW_h_5, and SCW_h_6 in the maximum scenario, as seen in Figure 21. Observing the first and the fifth building elements, although SCW_h_1 has the lower LCC, it has the higher total price among all calculation cases. Regarding the sixth and the second building elements, SCW_h_6 has a lower LCC than SCW_h_2. However, it has a higher total price in the first and third calculation cases. This is due to the nature of the environmental costs, as SCW_h_6 has higher total environmental costs but lower values in phases B and C, which results in lower environmental costs and total price in the second and fourth calculation cases. This is due to the use of Extruded polystyrene in SCW_h_2, which exerts high environmental costs in phases B and C.

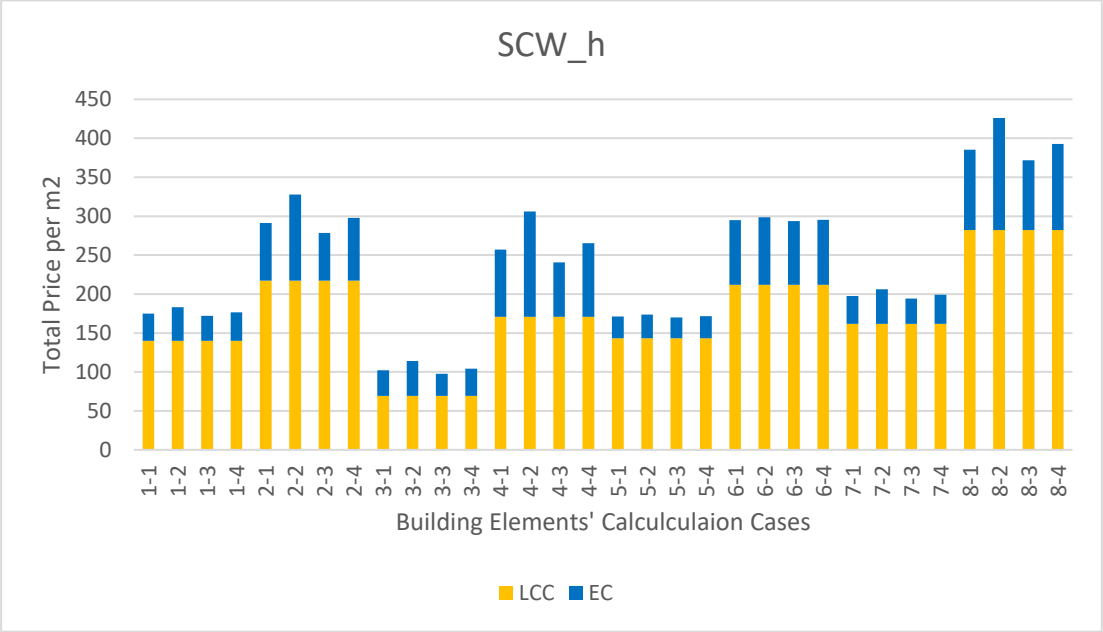

Figure 21 SCW_h max scenario

In the second scenario, the building elements are ranked based on the LCC from the most to the least cost-efficient, as the environmental costs do not impact the ranking of the elements' total price among all calculation cases.

In the mean scenario, the outcome is a bit similar to the maximum scenario, as shown in Figure 22. Starting with the first comparison between SCW_h_1 and SCW_h_5. The outcome mirrors the first scenario in the second calculation case. However, the total price difference, among other calculation cases, is negligible. Moreover, when comparing SCW_h_6 and SCW_h_2, the outcome slightly deviates from the maximum scenario as SCW_h_6 has only a higher overall cost in the first and third calculation cases.

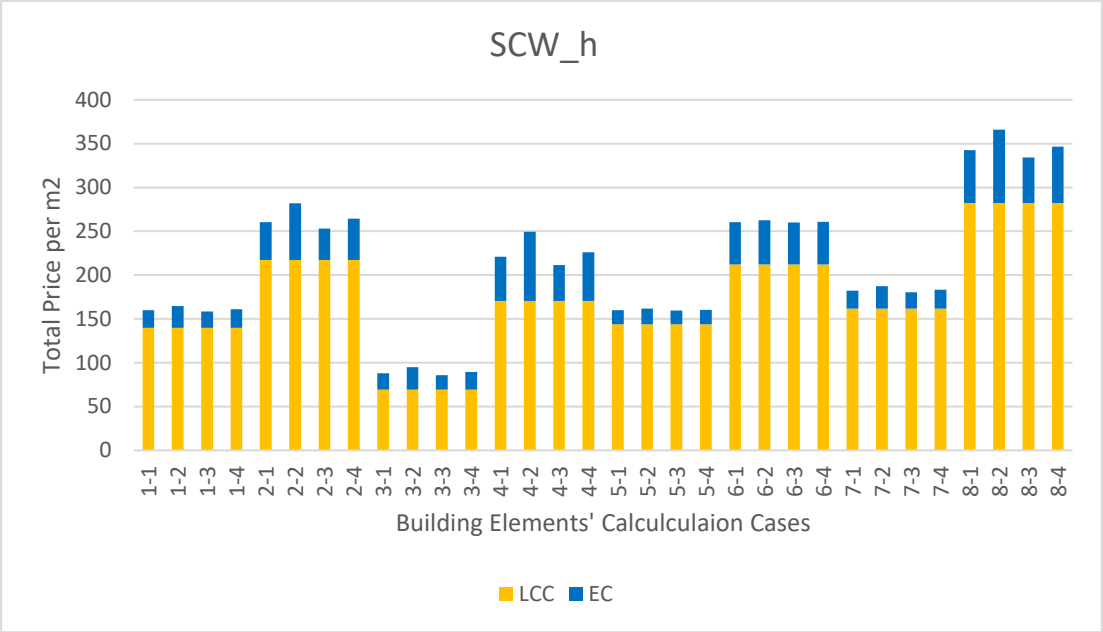

Figure 22 SCW_h mean scenario

SCW_uh is the fourteenth group. In this group, the environmental costs do not influence the ranking of the building elements among most calculation cases in the maximum scenario. However, this is not the case for the ranking of the least cost-efficient building elements, as shown in Figure 23. SCW_uh_8 is the building element with the highest LCC in this group. However, compared with SCW_uh_6, it has a lower total price per m2 among all calculation cases due to the impact of the environmental costs. The high environmental cost values are attributed to the 48 cm thick Aerated concrete building materials in SCW_uh_6, which has a higher environmental impact than the 30 cm thick reinforced concrete C30/37 with 2% steel. Finally, SCW_uh_3 has the lowest total LCC and environmental costs. The low environmental cost values are attributed to the calcium silicate bricks, which tend to be the ones with the lowest thickness in this group, with only 11.5 cm thickness.

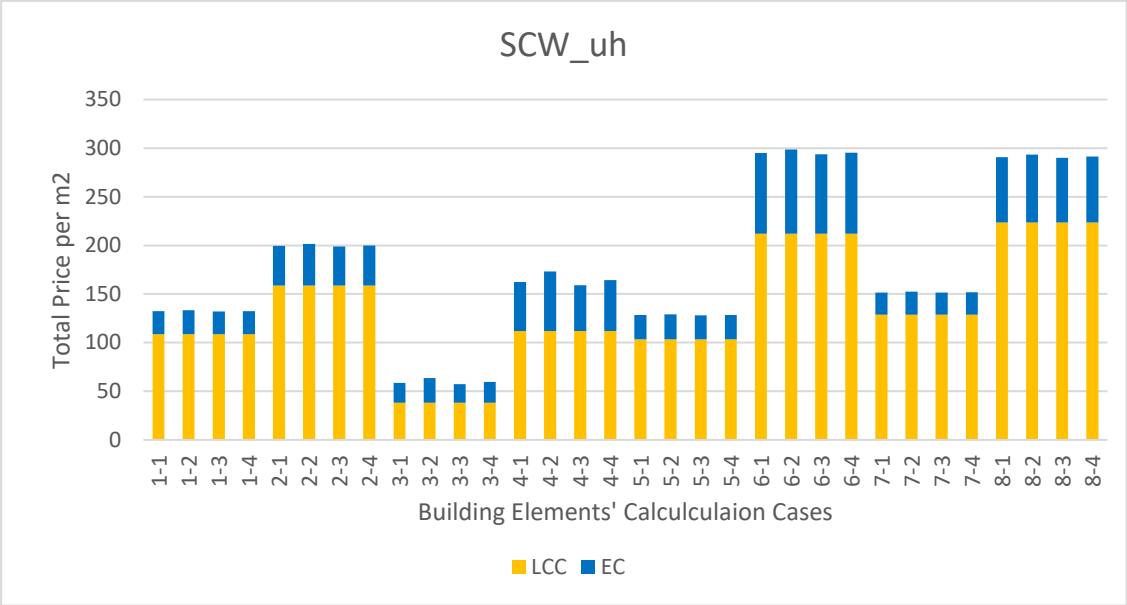

Figure 23 SCW_uh max scenario

In the minimum and mean scenarios, the ranking of the building elements is not impacted by the environmental costs in all calculation cases, as their values are insignificant compared to the LCC, which influences the total price per m2 and the ranking of the building elements.

In the fifteenth group, FL_mas, the environmental costs do not impact the ranking of the most to least efficient building elements, as the LCC is solely responsible for the ranking process across all scenarios and calculation cases in both groups, as building elements with higher LCC have higher environmental costs and total price as well. The low environmental cost values of FL_mas_1 are attributed to the reduced thickness of the C20/25 reinforced concrete with 1% steel and the Dry floor screed compared to the C30/37 reinforced concrete with 2% steel and the Cement screed.

In the sixteenth group, FL_wood, the environmental costs alter the ranking of FL_wood_3 and FL_wood_2 building elements in the maximum scenario, as demonstrated by Figure 24. FL_wood_3 has a lower LCC than FL_wood_2 but shows higher overall costs in the first, third, and fourth calculation cases. This can be attributed to the increased environmental costs associated with ADPE emitted from damp insulation during the production phase of the materials.

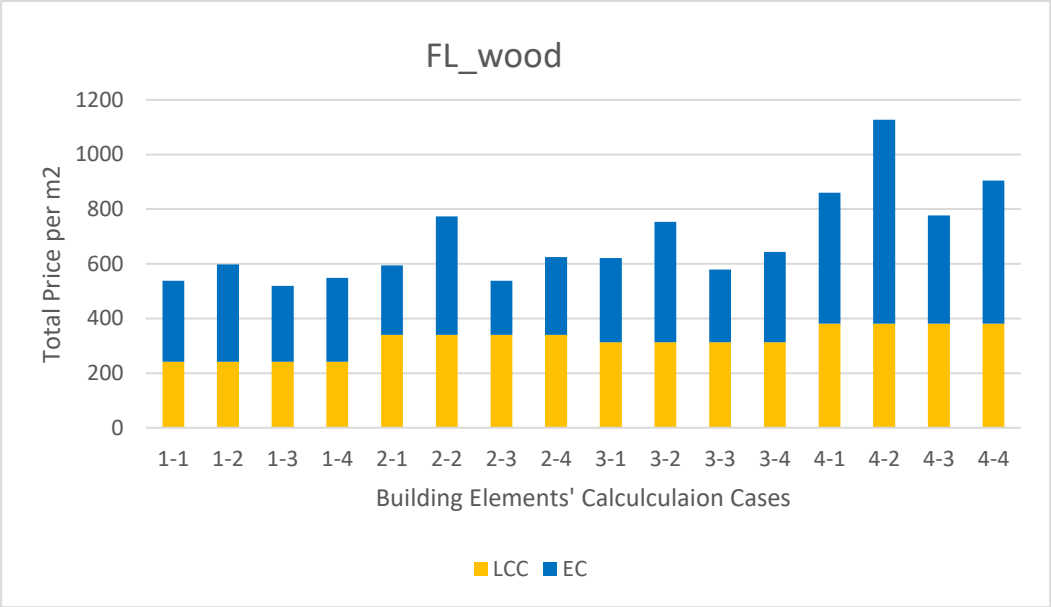

Figure 24 FL_wood max scenario

In the minimum scenario, the outcome differs from the maximum scenario, as the environmental costs do not contribute to or change the ranking of the building elements, as the LCC is responsible solely for the ranking process.

In the mean scenario, the outcome of the FL_wood_3 and FL_wood_2 building elements mirrors the maximum scenario despite the value difference, as demonstrated in Figure 25.

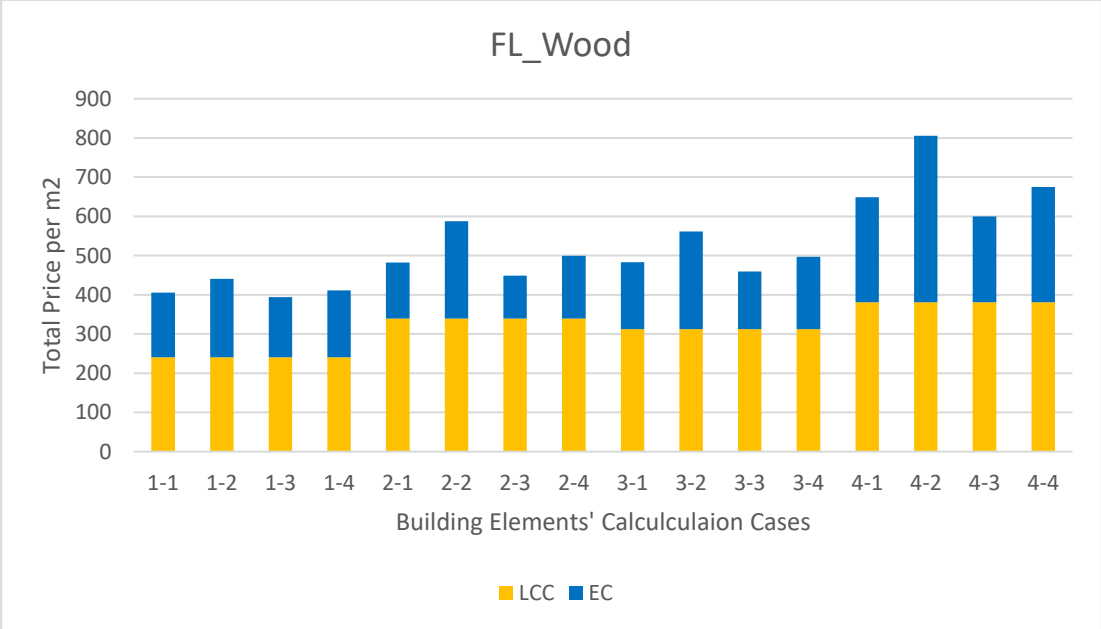

Figure 25 FL_wood mean scenario

In the seventeenth group, TFL_mas, the outcome is similar to the fifteenth group, as the environmental costs do not impact the ranking of the most to least efficient building elements,

as the LCC is solely responsible for the ranking process across all scenarios and calculation cases in both groups, as building elements with higher LCC have higher environmental costs and total price as well. TFL_mas_1 has the lowest environmental cost in this group. This is due to the lower environmental emissions and the reduced thickness of the C20/25 reinforced concrete with 1% steel compared to the C30/37 reinforced concrete with 2% steel.

In the eighteenth group, TFL_wood, the environmental costs play an essential role in influencing the choice of the most cost-efficient building element in the maximum scenario, as shown in Figure 26. TFL_wood_3 is the building with the least LCC in this group. However, due to the significant difference in environmental price compared to TFL_wood_1, It has a higher total among the four calculation cases, which makes the first building element the most cost-efficient option despite having a higher LCC. Also, despite the considerable difference in LCC compared to TFL_wood_2, TFL_wood_3 still has almost a higher total price among all calculation cases except the second, because of the higher environmental emissions of wood fiberboard in phase C of TFL_wood_2.

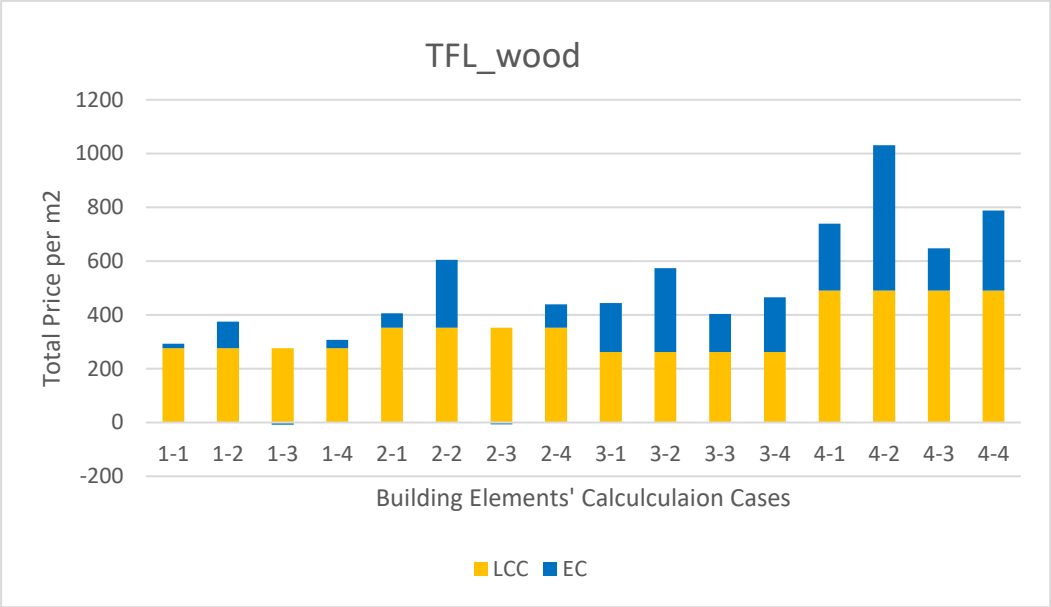

Figure 26 TFL_wood max scenario

In the minimum scenario, the outcome differs from the first scenario, as the environmental costs do not influence the ranking of different building elements—they are ranked from the most to least cost-efficient based only on LCC.

In the mean scenario, the outcome is similar to the first scenario., as TFL_wood_3 has a higher total price in all calculation cases compared to TFL_wood_1, as shown in Figure 27. However, in this scenario, TFL_wood_2 has the higher total price among all calculation cases despite the lower environmental costs.

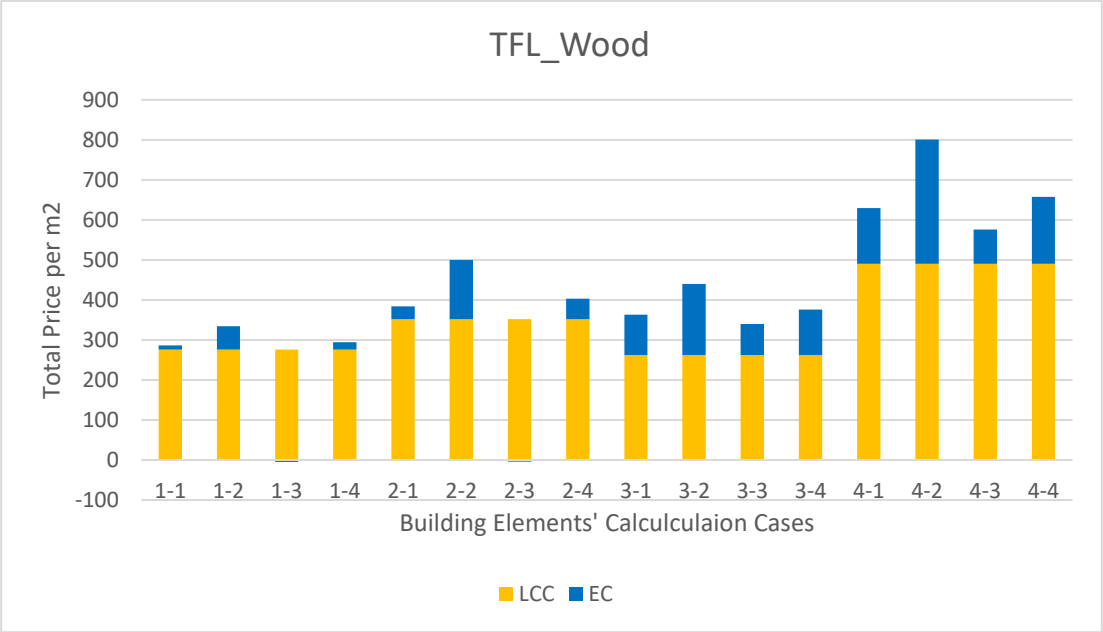

Figure 27 TFL_wood mean scenario

In the nineteenth and tweeny groups, CFL_mas and CFL_wood, the ranking is based on the LCC values, where the building element with higher LCC values has higher environmental costs in all scenarios and among all calculation cases. Therefore, the environmental costs did not influence the ranking by making building elements with lower LCC values have higher total prices per m2.

Even though significant environmental costs exist in both the BP_h and BP_uh groups, these costs do not determine the ranking of building elements from most to least cost-efficient in all scenarios and the four calculation cases. This is because the element with the higher LCC has higher environmental costs, impacting the overall cost and the ranking of the elements. The main reason for the environmental cost differences between these building elements in each group is the difference in material thickness.

In groups twenty-three and twenty-four, W_alu and W_plas, the results are consistent with the last four groups, as the environmental costs do not affect the ranking of the most cost-efficient building elements, even though they have high value. This is attributed to the building elements' considerably high values of LCC.

Finally, in the twenty-fifth group, W_wood, the environmental costs are determinant in ranking the least cost-efficient building element in the maximum scenario in this group, as shown in Figure 28. W_wood_2 has the uppermost LCC value in this group. However, W_wood_4 has the highest total price per m2 among all calculation cases because of the higher environmental costs, which emerged from the difference in materials dimensions of the elements.

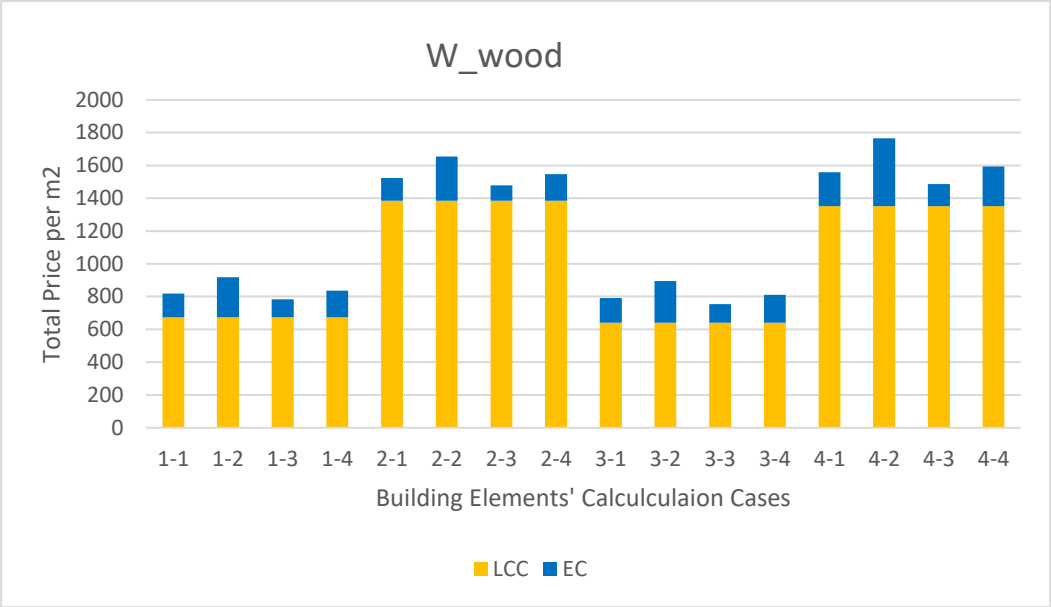

Figure 28 W_wood max scenario

In the minimum scenario, the outcome is different from the maximum scenario, as the environmental costs do not influence the ranking of the most cost-efficient building elements because of the low environmental cost values.

In the mean and final scenario, the results are more similar to the maximum scenario than the minimum scenario, as shown in Figure 29. The environmental costs have also played a crucial role in the ranking process in this scenario. Despite the lower LCC value, W_wood_4 has a higher total price in the first, second, and fourth calculation cases than W_wood_2.

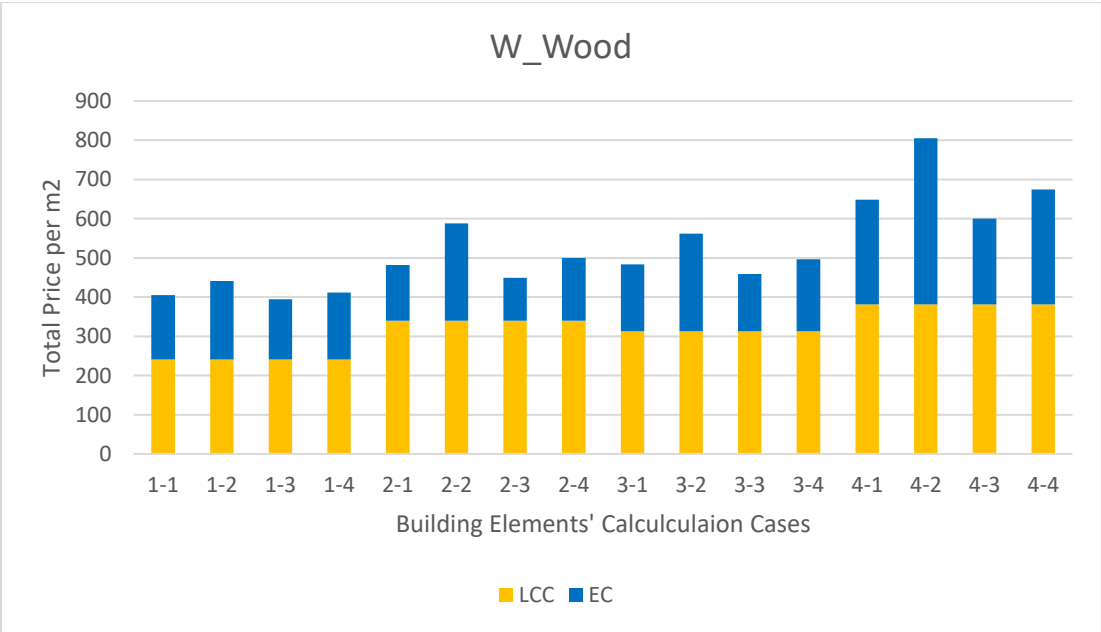

Figure 29 W_wood mean scenario

4.2 Environmental Cost Values and Proportion to the Total Price

In this part, the environmental costs are compared among each scenario and calculation case to show which building element and materials have the highest environmental costs and the building with the highest contribution of environmental costs to the total price per m2 and the highest environmental cost values.

Starting with the first scenario, the maximum scenario. The environmental costs as a percentage of the total price range from 5.0% to 71.0%, with the majority of elements falling within 10 to 30%, while the prices range from 5.0 to 784.6 €/m2, with the majority between 5.0 to 100 €/m2, as illustrated in Figure 30. The building elements with the lower percentages are W_alu_2, TFL_wood_1, and IW_wood_1 with 5, 6, and 6%, respectively, while BP_uh_1, BP_h_1, and BP_h_2 are the building elements with the highest percentage rate of environmental costs with 71.0, 70.0% and 68% respectively. What all the roof slap elements have in common are the damp insulation and the concrete materials, which correspondingly have significantly high ADPE and GWP environmental costs. The building elements with the lowest environmental cost values are IW_wood_1, SW_wood_1, and SW_wood_3, priced at 5.0, 7.8, and 9.5 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, BP_h_1, and BP_uh_2, priced at 784.6, 541.0, and 530.9 €/m2, respectively. Once more, ADPE's considerably high environmental cost of damp insulation and GWP's high environmental cost of concrete are the reason for the high environmental costs.

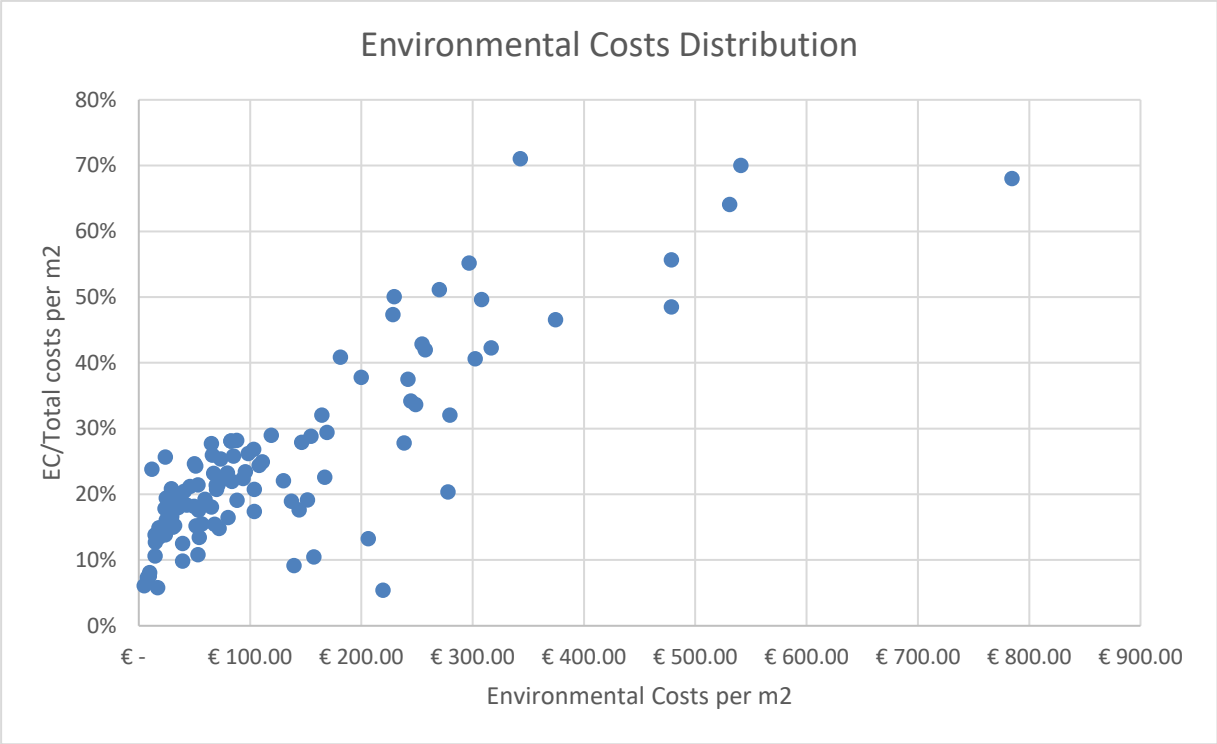

Figure 30 Environmental costs distribution maximum scenario first calculation case

The results of the second calculation case slightly differ from those of the first. The percentage of environmental costs to the total price ranges from 7% to 72%, with the majority of elements falling within 10 to 50%, while the prices range from 13.8 to 875.0 €/m2, with the majority between 20 to 300 €/m2, as illustrated in Figure 31. The building elements with the lowest percentages are W_alu_2, IW_mas_1, and IW_mas_2, with 7, 10, and 14%, respectively, while BP_h_1, BP_uh_1, and BP_h_2 are the building elements with the highest percentage rate of environmental costs with 72,71 and 70% respectively. The building elements with the lowest environmental cost values are IW_mas_1, IW_mas_5, and SW_mas_5, priced at 13.8, 19.3, and 19.7 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, FL_wood_4, and CFL_wood_4, priced at 875.0, 745.3, and 745.3 €/m2, respectively. The main reason for this difference is that the building elements with the highest or lowest values in the first calculation case do not necessarily hold the highest or lowest values among all considered phases of the building lifecycle. Also, the economic factors are not applied to all stages of the element life cycle, but only the phases that take place in the future, such as Phases B and C. This can be shown clearly in wood materials, where they have higher emissions in phase C compared to phase A, resulting in higher total emissions in calculation case 2. Also, materials such as Extruded polystyrene in BP_h_2 have emissions in phase B due to the lower reference service life compared to the study period and higher emission values in phase C compared to phase A.

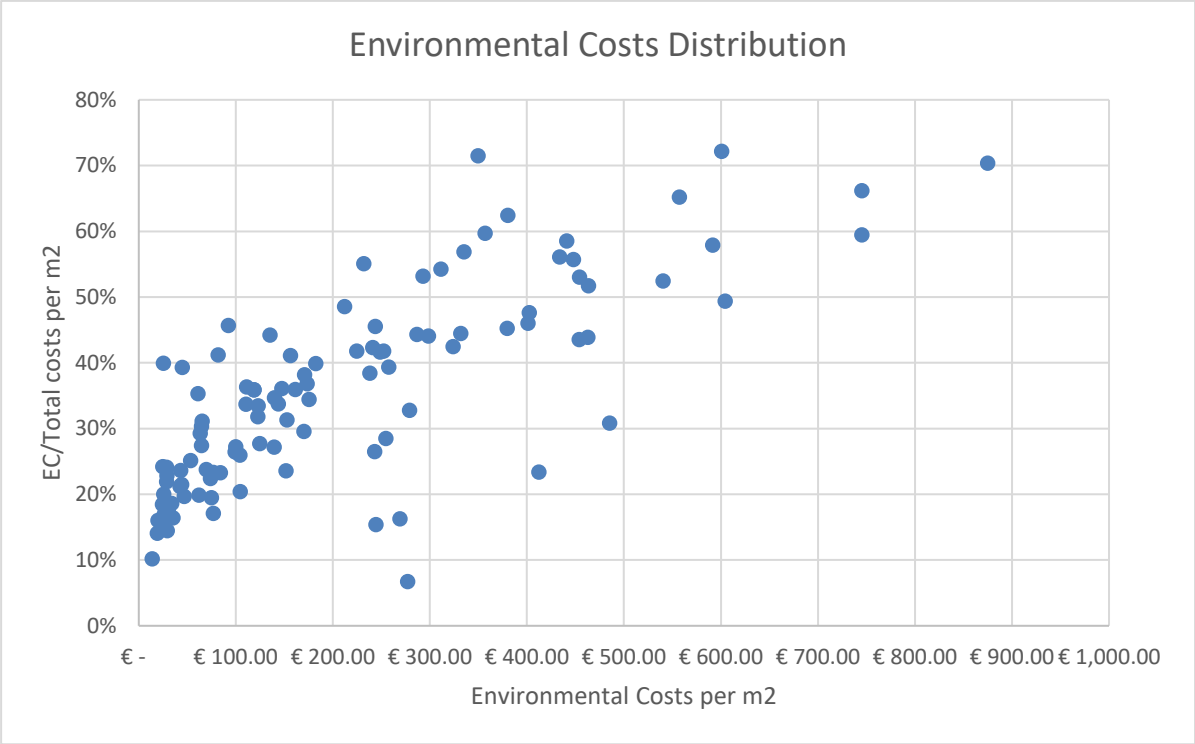

Figure 31 Environmental costs distribution maximum scenario second calculation case

The results of the third calculation case differ from those of the first and second, where there are negative values for environmental costs. The percentage of environmental costs to the total price ranges from -17% to 71%, with the majority of elements falling within 0 to 30%, while the prices range from -37.5 to 754.3 €/m2, with the majority between 0 to 100 €/m2, as illustrated in Figure 32. The building elements with the lower percentages are IW_wood_3, SW_wood_4, and SW_wood_3 with -17, -12, and -12%, respectively, while BP_uh_1, BP_h_1, and BP_h_2 are the building elements with the highest percentage rate of environmental costs with 71,69 and 67% respectively. The building elements with the lowest environmental cost values are SW_wood_4, IW_wood_4, and IW_wood_3, priced at -37.5, -30.8, and -16.0 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, BP_uh_2, and BP_h_1, priced at 754.3, 522.8, and 520.5 €/m2, respectively. Negative values indicate that the environmental cost reduces the total price. This can be attributed to certain materials' negative values in the product stages. When the values from the use and end-of-life stages are discounted, the negative values from the construction and production stages become dominant.

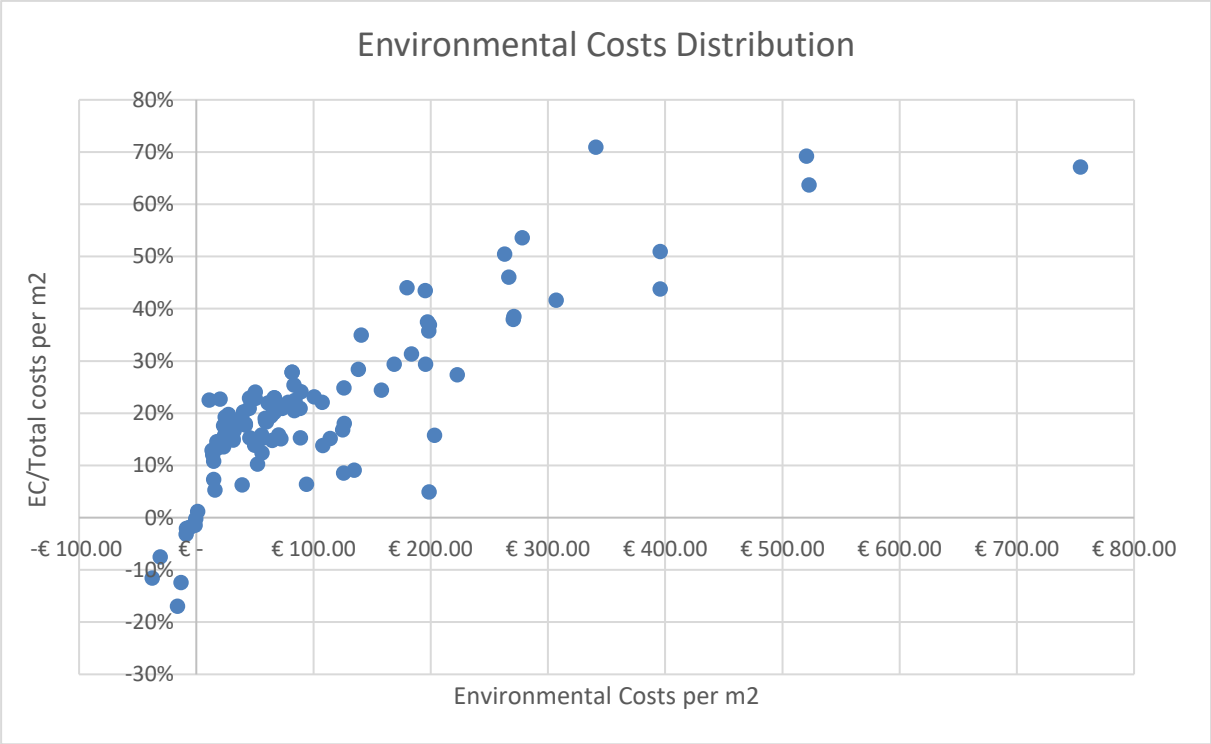

Figure 32 Environmental costs distribution maximum scenario third calculation case

The results in the fourth calculation case slightly differ from those of the previous two calculation cases. Still, they are somewhat similar to the first regarding ranking and the distribution of elements on the graph. The percentage of environmental costs to the total price ranges from 6 to 71%, with the majority of elements falling within 6 to 30%, while the prices range from 8.3 to 800.3 €/m2, with the majority between 10 to 150 €/m2, as illustrated in Figure 33. The building elements with the lower percentages are W_alu_2, IW_wood_1, and TFL_wood_1 with 6, 10, and 10%, while BP_uh_1, BP_h_1, and BP_h_2 are the building elements with the highest percentage rate of environmental costs with 71,70 and 68% respectively. The building elements with the lowest environmental cost values are IW_wood_1, SW_wood_1, and IW_mas_1, priced at 8.3, 11.4, and 14.4 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, BP_h_1, and BP_uh_2, priced at 800.3, 551.5, and 535.4 €/m2, respectively.

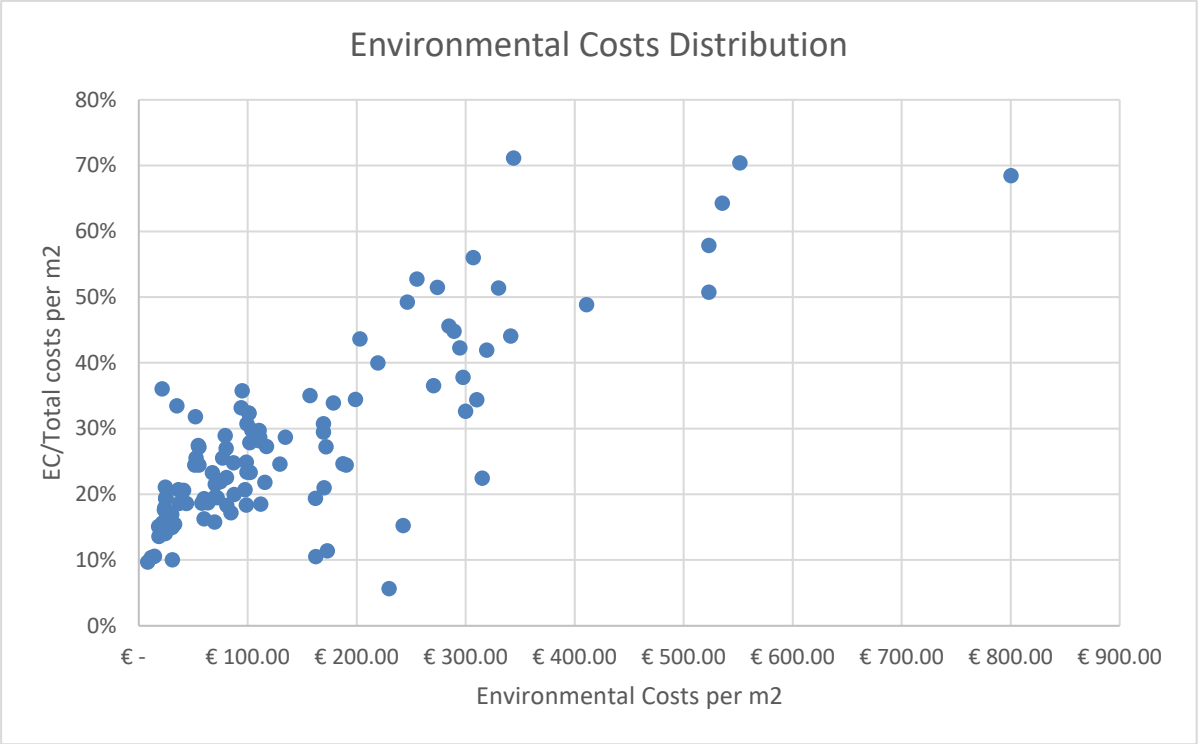

Figure 33 Environmental costs distribution maximum scenario fourth calculation case

In the minimum scenario, the environmental cost values mainly differ from those in the maximum scenario. This is due to each impact category's different values and contributions to the environmental costs, as the ADPE impact on the environmental costs is negligible compared to the maximum scenario, where it contributes significantly to the total environmental costs.

The environmental costs as a percentage of the total price range from 0.4% to 4.9%, with the majority of elements falling within 1.0 to 3.0%, while the prices range from 0.5 to 18.8 €/m2, with the majority between 0.5 to 10 €/m2, as illustrated in Figure 34. The building elements with the lowest percentages are W_alu_2, PRO_h_1, and PRO_uh_1 with 0.4%, while BP_h_2, BP_h_1, and BP_uh_2 are the building elements with the highest percentage rate of environmental costs with 4.9, 4.2% and 4.2% respectively. The building elements with the lowest environmental cost values are IW_wood_1, SW_wood_1, and SW_wood_3, priced at 0.5, 0.7, and 0.9 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, CW_h_8, and CW_h_8, priced at 18.8, 14.5, and 13.4 €/m2, respectively.

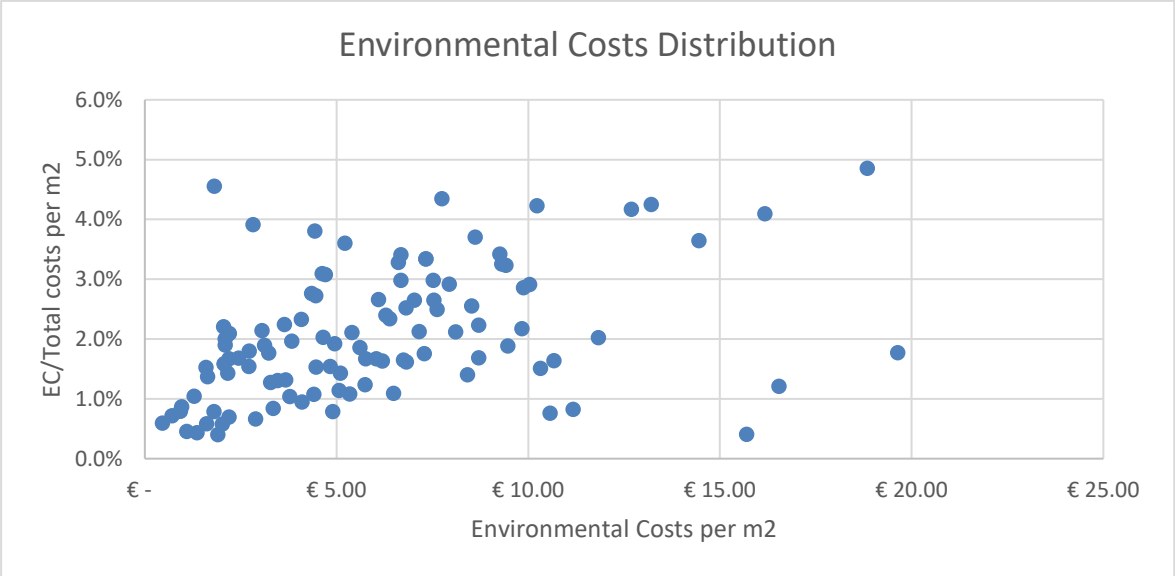

Figure 34 Environmental costs distribution minimum scenario first calculation case

In the second calculation case, the percentage of environmental costs to the total price ranges from 0.5% to 10.1%, with most elements falling within 1.0 to 4.0%. The prices range from 1.2 to 35.0 €/m2, with the majority between 1.2 to 15.0 €/m2, as illustrated in Figure 35. The building elements with the lower percentages are W_alu_2, IW_mas_1, and EW_mas_2 with 0.5, 1.0, and 1.1%, respectively, while FRO_wood_3, IW_wood_2, and FL_wood_4 are the building elements with the highest percentage rate of environmental costs with 10.1, 7.8, and 7.8% respectively. The building elements with the lowest environmental cost values are IW_mas_1, IW_mas_5, and SW_mas_5, priced at 1.2, 1.7, and 1.7 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are W_plas_2, W_wood_4, and FL_wood_4, priced at 35.0, 34.1, and 32.3 €/m2, respectively.

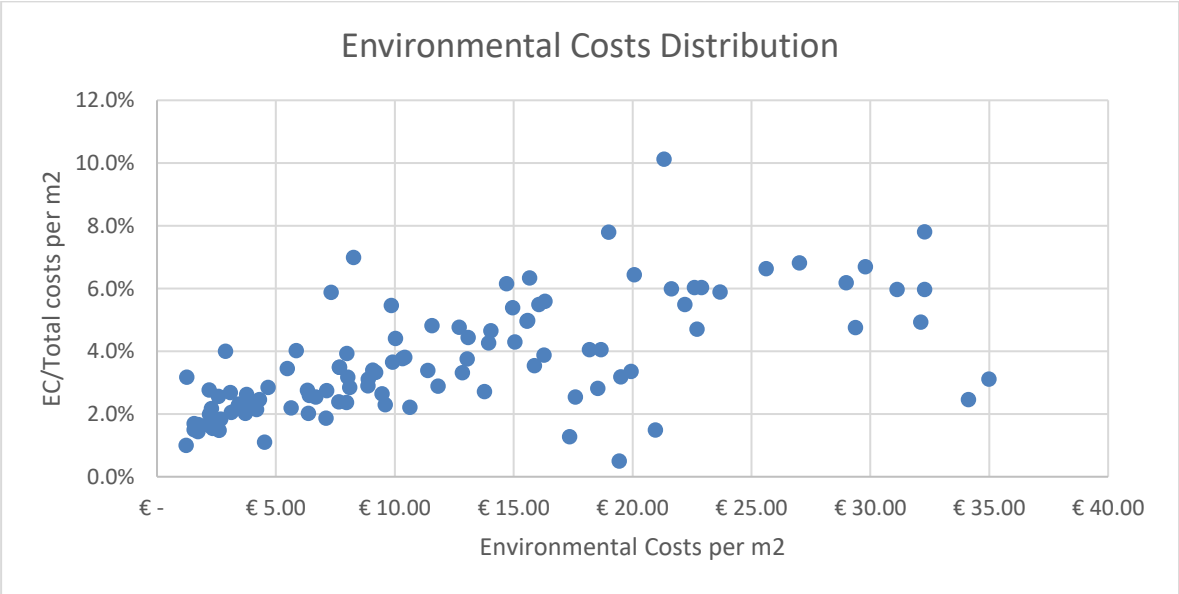

Figure 35 Environmental costs distribution minimum scenario second calculation case

In the third calculation case, the percentage of environmental costs to the total price ranges from -1.2 to 4.2%, with the majority of elements falling within -0.5 to 2.0%, while the prices range from -3.6 to 16.1 €/m2, with the majority between -1.5 to 10.0 €/m2, as illustrated in Figure 36. The building elements with the lower percentages are IW_wood_3, SW_wood_3, and SW_wood_4 with -1.2, -0.9, and -0.8%, respectively, while BP_h_2, BP_uh_2, and BP_h_1 are the building elements with the highest percentage rate of environmental costs with 4.2, 4.0 and 3.5% respectively. The building elements with the lowest environmental cost values are EW_wood_4, SW_wood_4, and TFL_wood_4, priced at -3.6, -3.0, and -2.7 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, W_alu_2, and W_plas_2, priced at 16.1, 14.4, and 14.1 €/m2, respectively.

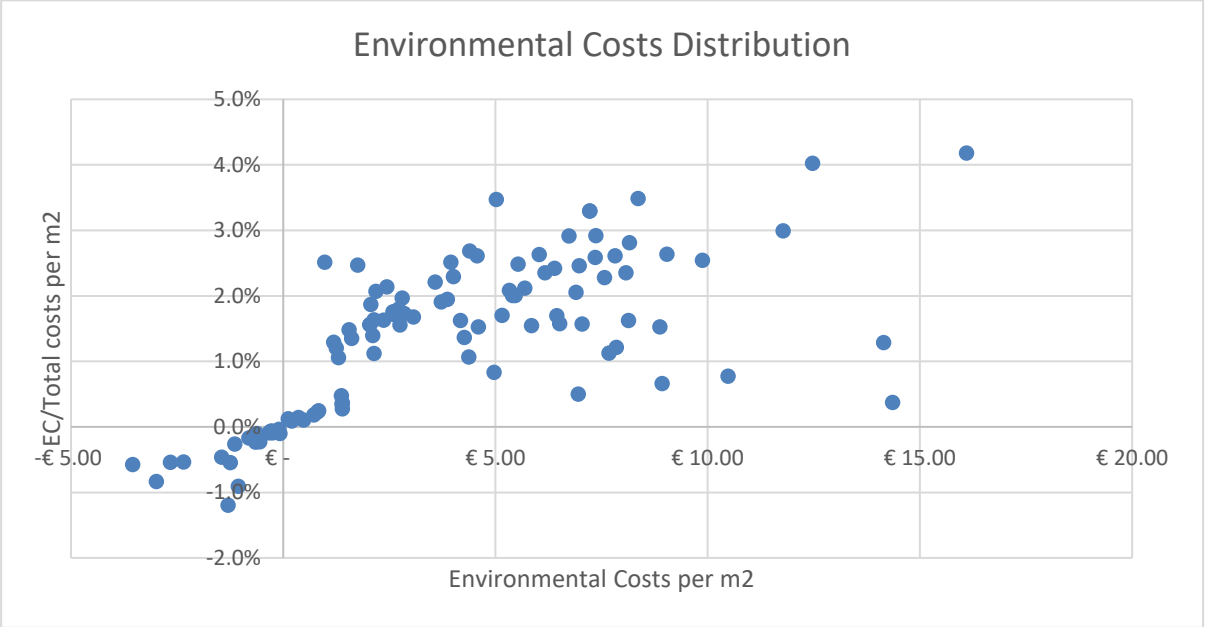

Figure 36 Environmental costs distribution minimum scenario third calculation case

In the fourth calculation case, the percentage of environmental costs to the total price ranges from 0.4 to 5.2%, with the majority of elements falling within 1.0 to 3.0%, with prices ranging from 0.8 to 20.3 €/m2, with the majority between 0.8 to 10.0 €/m2, as illustrated in Figure 37. The building elements with the lowest percentages are W_alu_2, PRO_uh_1, and FL_wood_1, and PRO_h_1 with 0.4, 0.7, and 0.8%, while BP_h_2, BP_h_1, and FRO_wood_3 are those with the highest percentage rate of environmental costs with 5.2, 4.6 and 4.6% respectively. The elements with the lowest environmental cost values are IW_wood_1, SW_wood_1, IW_mas_1, priced at 0.8, 1.0, and 1.3 €/m2, respectively. Conversely, the elements with the highest environmental cost values are W_plas_2, BP_h_2, and W_wood_4, priced at 22.4, 20.3, and 19.6 €/m2, respectively.

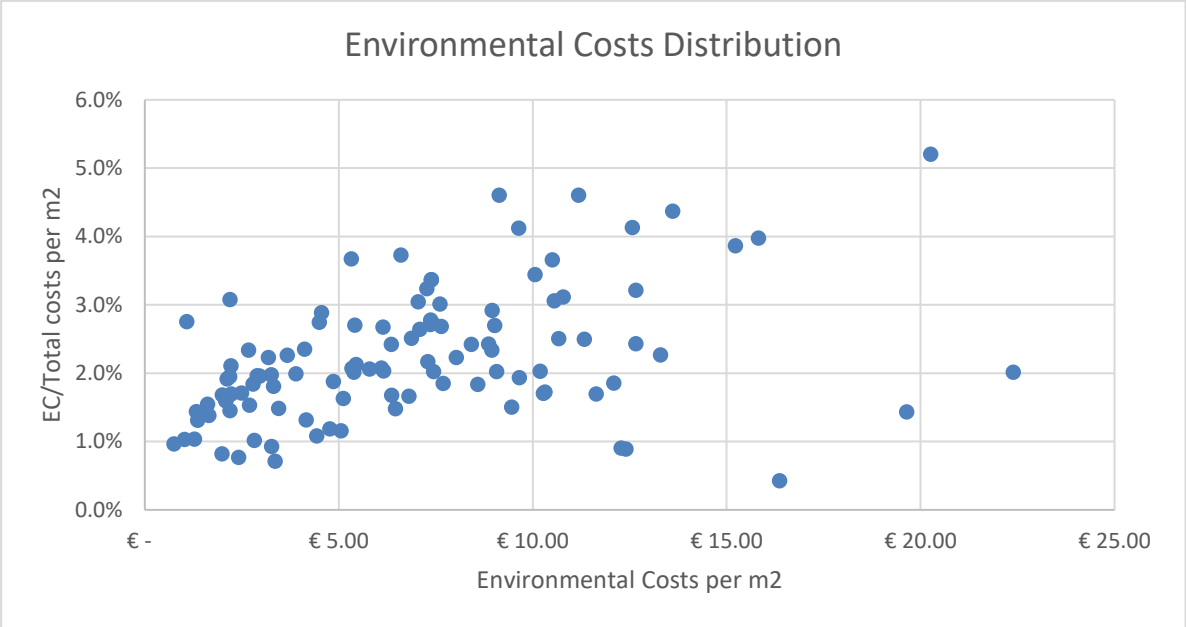

Figure 37 Environmental costs distribution minimum scenario fourth calculation case

The outcome of the third scenario is similar to the maximum scenario, as the building elements are ranked and distributed on graphs similarly despite the value difference in the environmental costs.

In the first calculation case, the percentage of environmental costs to the total price ranges from 3.0% to 58.0%, with the majority of elements falling within 3.0 to 20.0%, while the prices range from 2.9 to 439.9 €/m2, with the majority between 1.0 to 100.0 €/m2, as illustrated in Figure 38. The building elements with the lowest percentages are W_alu_2, TFL_wood_1, and IW_wood_1 with 3, 3, and 4%, respectively, while BP_uh_1, BP_h_1, and BP_h_2 are the building elements with the highest percentage rate of environmental costs with 58.0, 57.0% and 54% respectively. The building elements with the lowest environmental cost values are IW_wood_1, SW_wood_1, and SW_wood_3, priced at 2.9, 4.5, and 5.5 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, BP_h_1, and BP_uh_2, priced at 439.9, 302.4, and 297.7 €/m2, respectively.

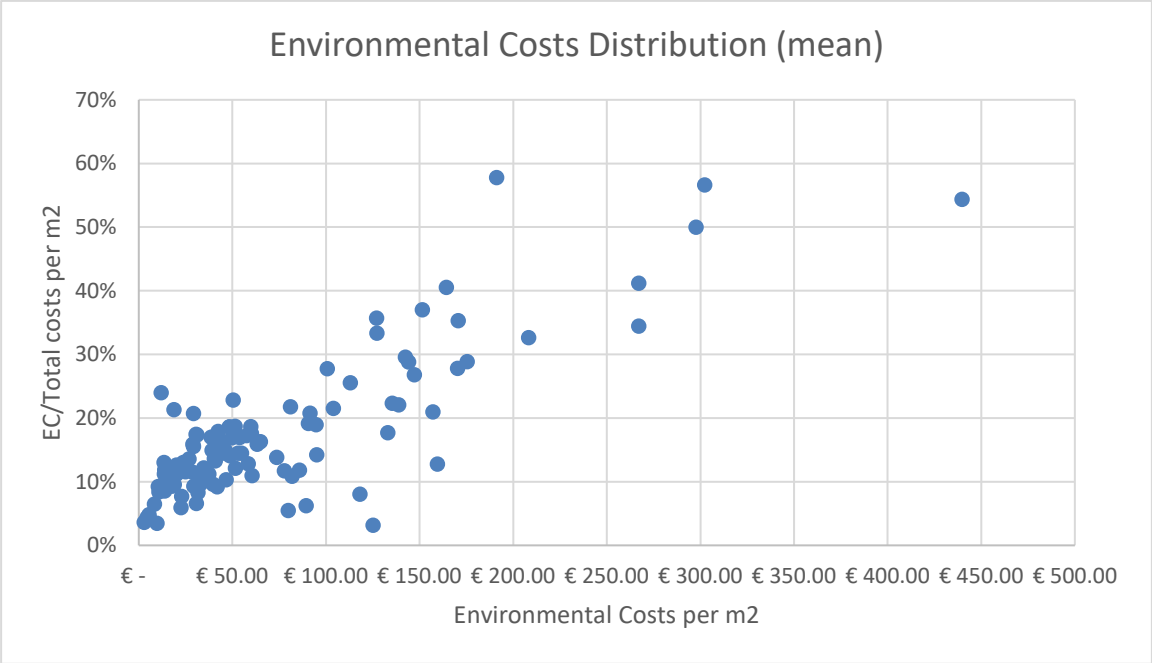

Figure 38 Environmental costs distribution mean scenario first calculation case

In the second calculation case, the percentage of environmental costs to the total price ranges from 4.0% to 59.0%, with most elements falling within 10.0 to 30.0%. The prices range from 8.0 to 492.9 €/m2, with the majority between 8.0 to 150.0 €/m2, as illustrated in Figure 39. The building elements with the lowest percentages are W_alu_2, IW_mas_1, and IW_mas_2 with 4.0, 6.0, and 9.0%, respectively, while BP_h_1, BP_uh_1, and BP_h_2 are the building elements with the highest percentage rate of environmental costs with 59.0,58.0 and 57.0% respectively. The building elements with the lowest environmental cost values are IW_mas_1, IW_mas_5, and SW_mas_5, priced at 8.0, 11.3, and 11.5 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, FL_wood_4, and CFL_wood_4, priced at 492.9, 423.9, and 423.9 €/m2, respectively.

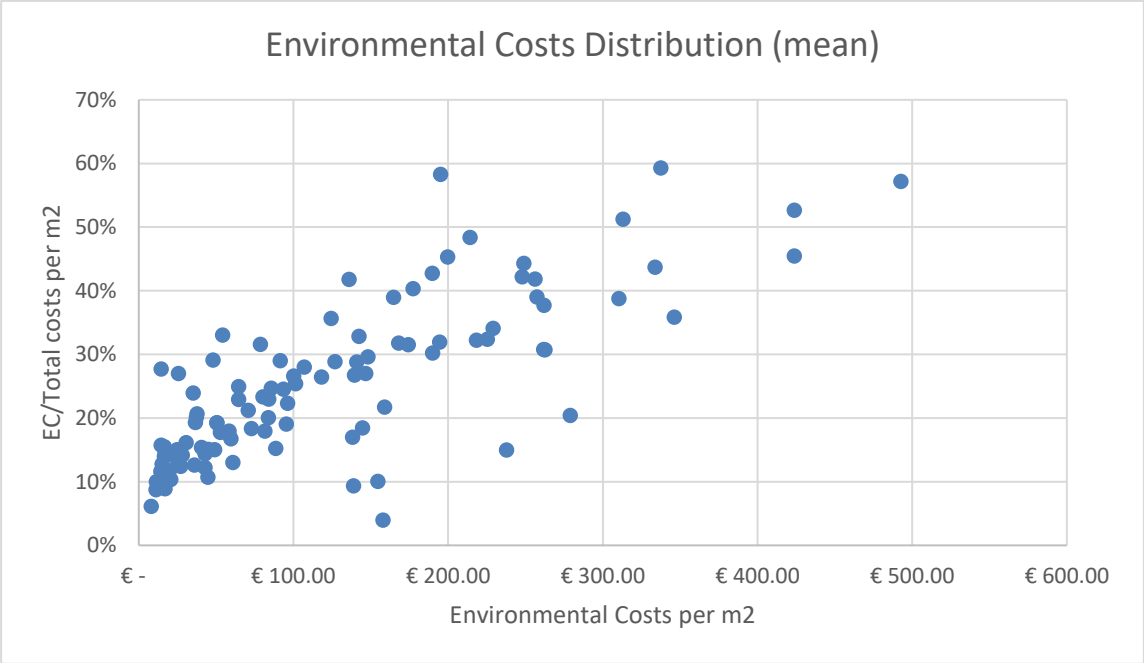

Figure 39 Environmental costs distribution mean scenario second calculation case

In the third calculation case, the percentage of environmental costs to the total price ranges from -10.0 to 58.0%, with the majority of elements falling within 0.0 to 20.0%, while the prices range from -22.5 to 422.1 €/m2, with the majority between 0.0 to 100.0 €/m2, as illustrated in Figure 40. The building elements with the lower percentages are IW_wood_3, SW_wood_4, and SW_wood_3 with -10.0, -7.0, and -7.0 %, respectively, while BP_uh_1, BP_h_1, and BP_h_2 are the building elements with the highest percentage rate of environmental costs with 58.0, 56.0 and 53.0% respectively. The building elements with the lowest environmental cost values are SW_wood_4, IW_wood_4, and IW_wood_3, priced at -22.5, -18.6, and -9.6 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, BP_uh_2, and BP_h_1, priced at 422.1, 292.9, and 290.4 €/m2, respectively.

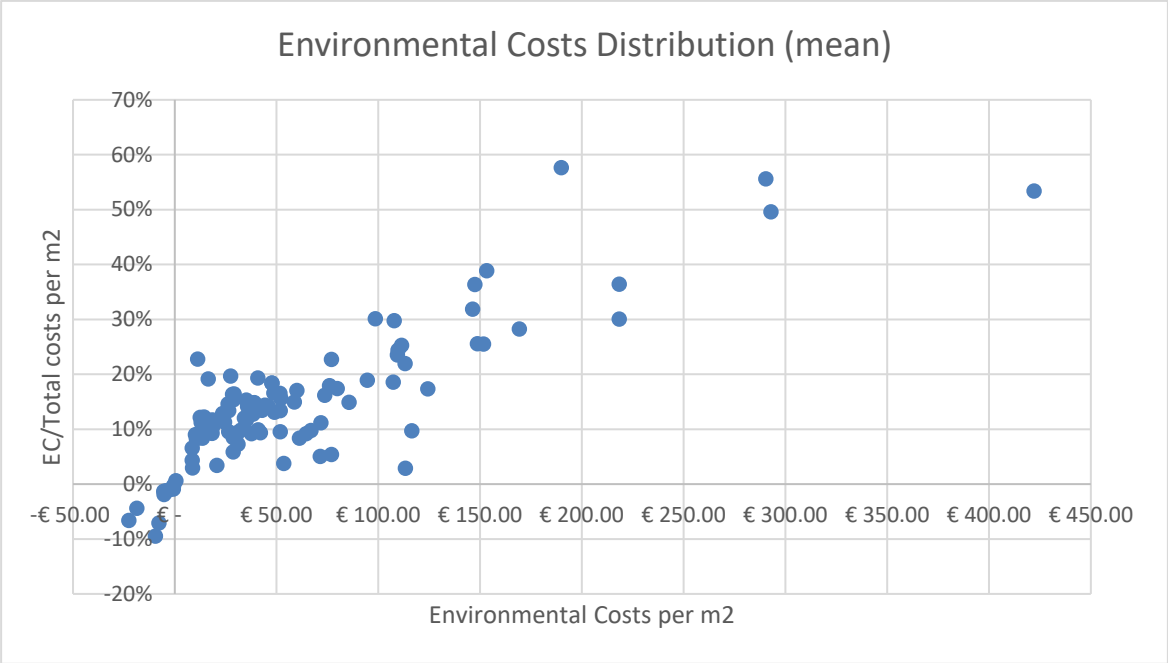

Figure 40 Environmental costs distribution mean scenario third calculation case

In the fourth calculation case, the percentage of environmental costs to the total price ranges from 3.0 to 58.0%, with the majority of elements falling within 6.0 to 20.0%, with prices ranging from 4.8 to 449.1 €/m2, with the majority between 8.0 to 100.0 €/m2, as illustrated in Figure 41. The building elements with the lowest percentages are W_alu_2, IW_wood_1, and TFL_wood_1 with 3.0, 6.0, and 6.0%, while BP_uh_1, BP_h_1, and BP_h_2 are the building elements with the highest percentage rate of environmental costs with 58.0,57.0 and 55.0% respectively. The building elements with the lowest environmental cost values are IW_wood_1, SW_wood_1, and IW_mas_1, priced at 4.8, 6.6, and 8.4 €/m2, respectively. Conversely, the building elements with the highest environmental cost values are BP_h_2, BP_h_1, and BP_uh_2, priced at 449.1, 308.5, and 300.2 €/m2, respectively.

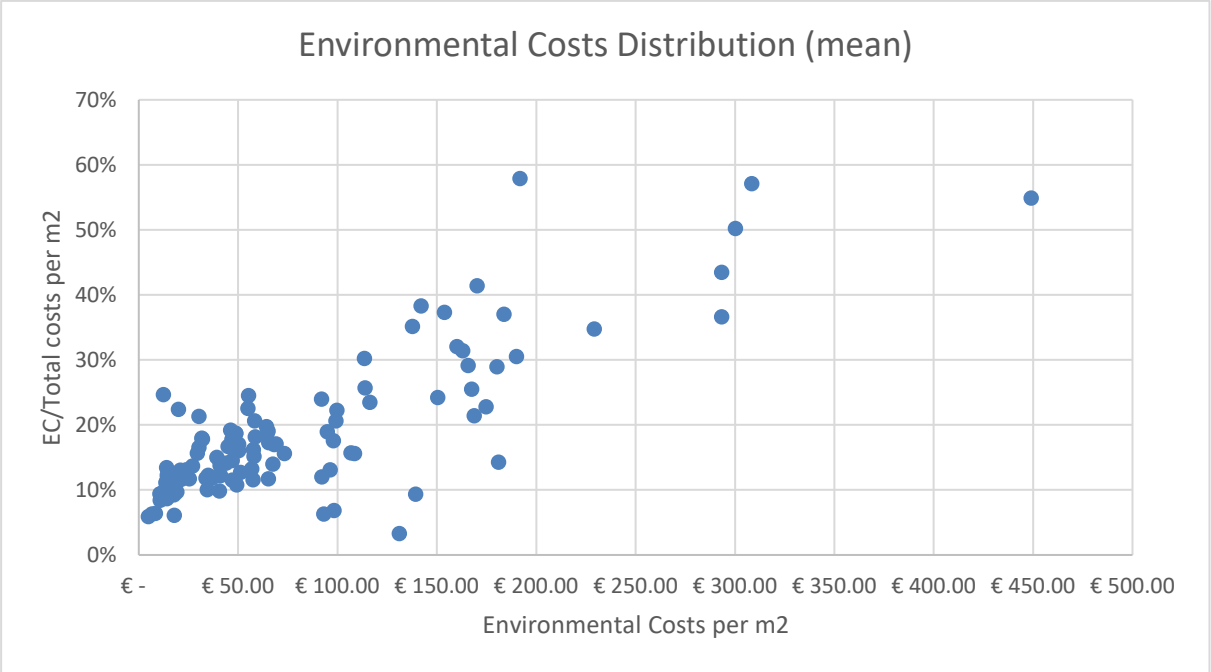

Figure 41 Environmental costs distribution mean scenario fourth calculation case

4.3 Proportion of Impact Categories to the Environmental Costs

Starting with the contribution of impact categories in maximum scenarios. The average percentages of contribution are as follows: 71% for GWP with values ranging between 3 to 96%, 0% for ODP and EP freshwater, 4% for AP with values ranging between 0 to 11%, 2% for POCP with values ranging between 0 to 8%, and 23% for ADPE with values ranging between 0 to 96% as illustrated in Figure 42.

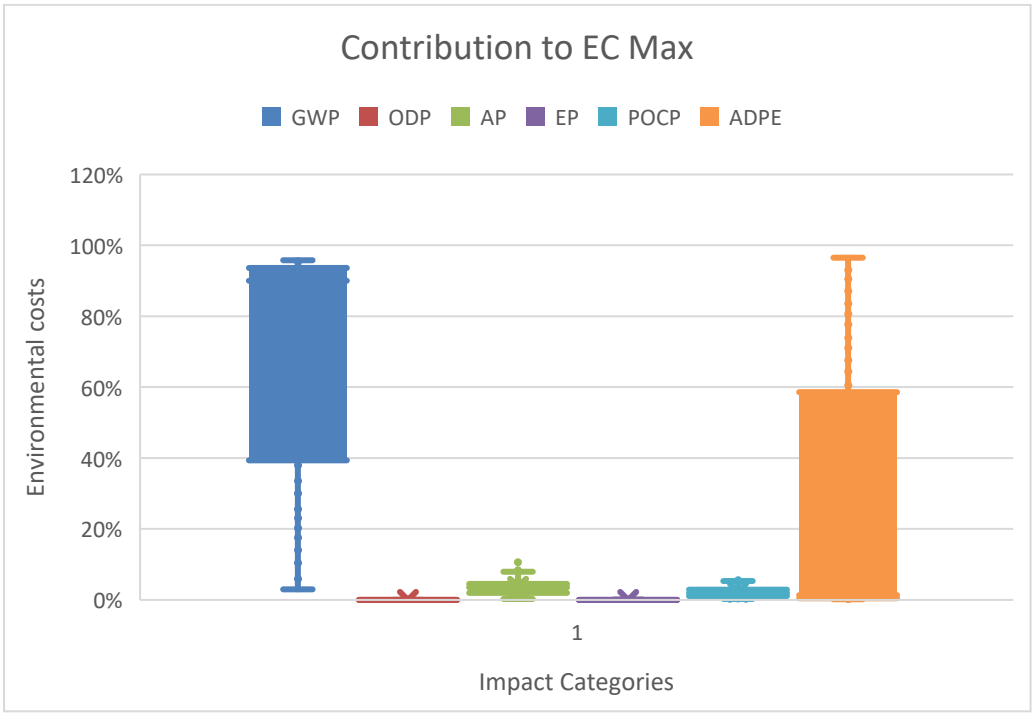

Figure 42 Contribution of impact categories in maximum scenario

In the minimum scenario, the contribution values of the impact categories to the total environmental costs are different from the previous scenario, as shown in Figure 43. However, the same three impact categories are responsible for the overall environmental costs in this scenario, and they are GWP, with values ranging between 68 to 95% and an average value of 87.5%; POCP, with values ranging between 5 to 29% and the average value of 12.1%, and ADPE with values ranging between 0 to 6% and an average value of 0.4%. The ODP and EP impact categories contribute with only 0%.

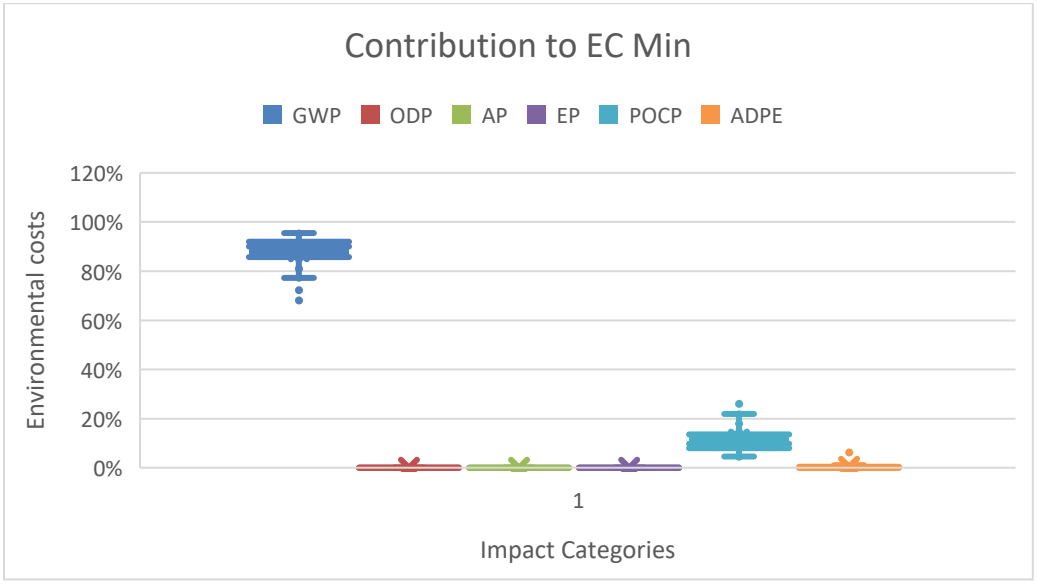

Figure 43 Contribution of impact categories in minimum scenario

In the mean scenario, the contribution of impact categories is similar to those in the maximum scenario. The average percentages of contribution are as follows: 72% for GWP with values ranging between 3 to 96%, 0% for ODP and EP freshwater, 2% for AP with values ranging between 0 to 7%, 3% for POCP with values ranging between 0 to 9%, and 23% for ADPE with values ranging between 0 to 96% as illustrated in Figure 44.

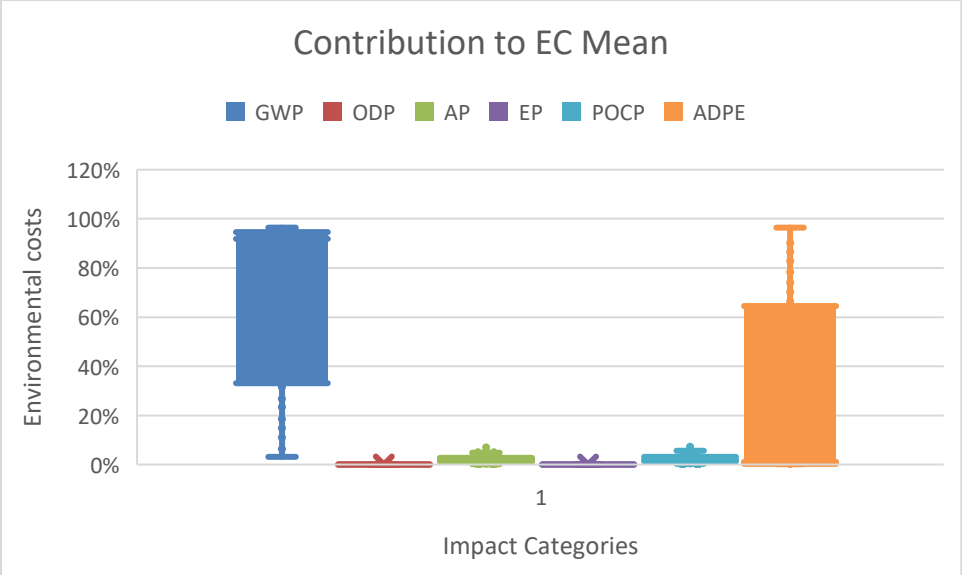

Figure 44 Contribution of impact categories in mean scenario

4.4 CO2 Price

After investigating the potential influence of monetizing environmental impacts on material and building element selections, the second step involves comparing the current CO2 price implemented by the German government to the calculated environmental cost in this research. As mentioned, the comparison will include only the first calculation case in the three scenarios, as the economic impacts will not be a part of it.

Starting with the maximum scenario. The CO2 cost used in Germany failed to cover the environmental costs of the different building elements used in this study, as shown in Figure 45. Furthermore, the CO2 price represents only approximately 2 to 63% of the environmental costs. The difference in price between environmental costs and the CO2 price ranges from 2.03 to 656.2 €/m2, highlighting the gap that the CO2 price has failed to address. This is due to the higher emissions values and the contribution of emissions to the total cost, as building elements with lower GWP contributions tend to have the lowest percentage of CO2 price representation. FL_wood_1 is an example, with only 2% CO2 price coverage. This is due to

the damp insulation's significantly higher ADPE values than the building element's exerted GWP emissions.

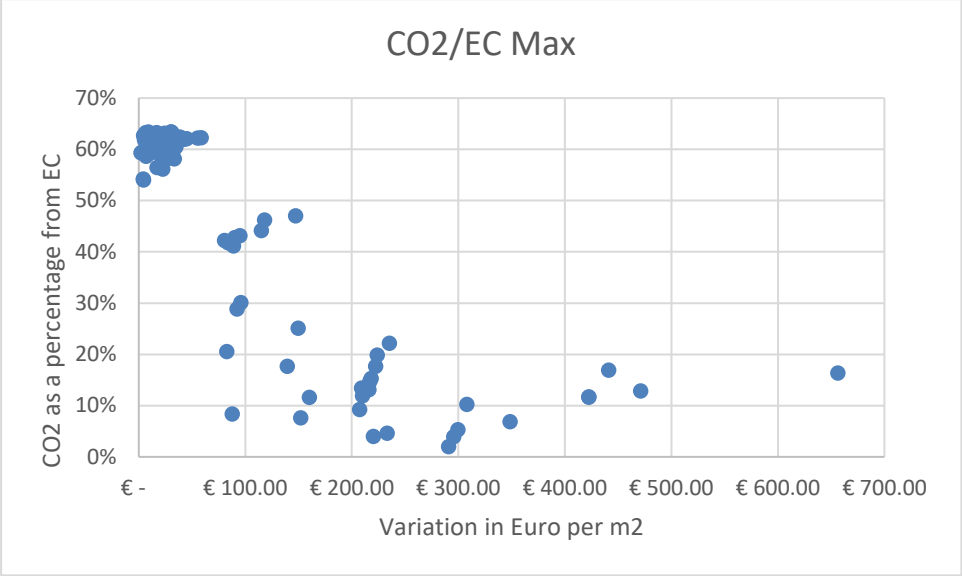

Figure 45 CO2/ EC maximum scenario

In the minimum scenario, the results are totally different from the previous one, as clearly illustrated in Figure 46. The CO2 price is tremendously higher than the environmental costs for the different building elements. CO2 price represents approximately 511 to 716% of the environmental costs. The difference in price between environmental costs and the CO2 price ranges from – 2.5 to -111.0 €/m2. The reason for the exceptionally varied results is the extremely low monetary values from Table 11, with a significant difference from the monetary values used in the previous scenario.

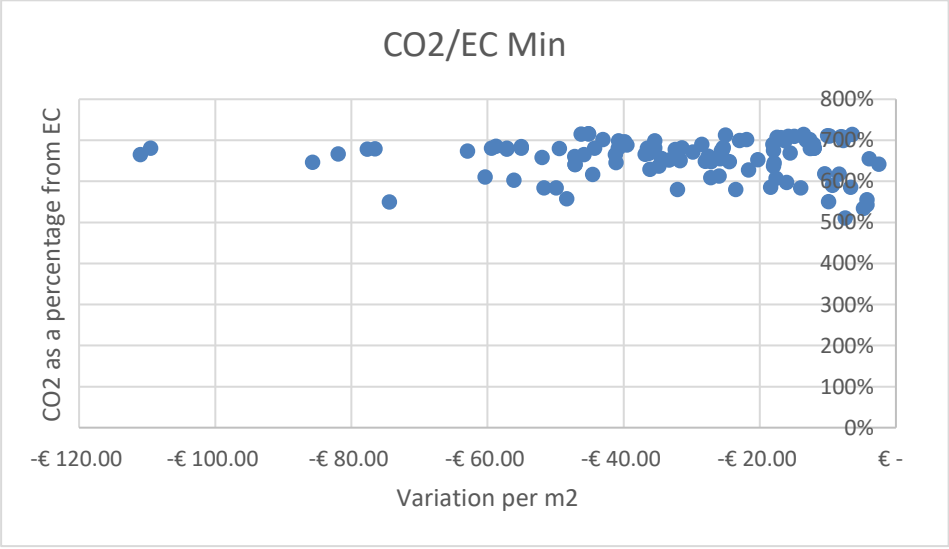

Figure 46 CO2/ EC minimum scenario

Finally, in the mean scenario, CO2 price can be more representative of the environmental costs of different building elements compared to the previous scenarios. This is because the calculation gap is much smaller, and the value differences are also insignificant in building elements, where GWP is the main contributor to environmental costs. However, the CO2 price remains insufficient to cover the environmental costs for all building elements. The CO2 price accounts for 4.0 to 108.0% of the environmental costs, with variations in price ranging from -5.8 to 311.5 €/m2 compared to environmental costs, as seen in Figure 47.

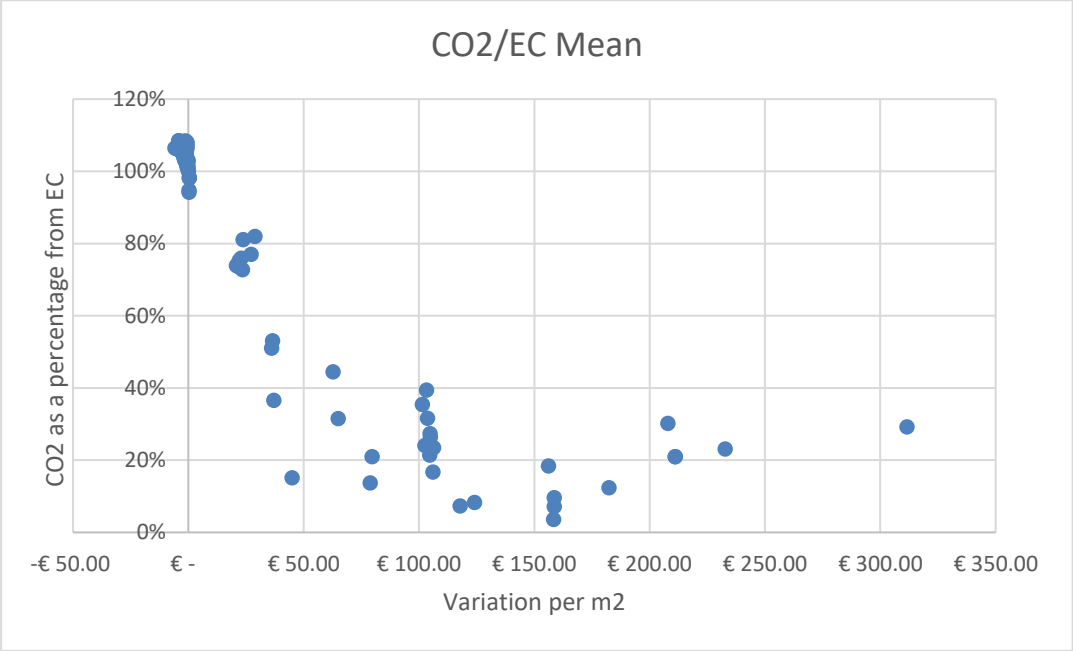

Figure 47 CO2/ EC mean scenario

4.5 Summary & Discussion

The fourth chapter introduced the results of the case study in several methods. First, the influence of environmental costs on ranking has been examined in three different scenarios and four calculation cases. The results analysis in section 4.2 has shown how the results varied significantly in the three scenarios. This can be justified by the fact that there is a considerable difference between the maximum and minimum monetary factors used, especially in GWP and ADPE, influencing the monetary factors used in the mean scenario as well. Moreover, different calculation cases led to different results and outcomes among building elements with similar environmental costs in calculation case one. This occurs due to the varying nature of environmental emissions values across different LCA phases Economic factors are only part of phases B and C as they only happen in the future. Therefore, they are utilized to calculate

the current prices based on the future value of money. As a result, environmental costs vary significantly when there are remarkable value differences in the previously mentioned LCA phases, especially in calculation case two, where a 2% rate is applied to account for the future price. Furthermore, presenting the results of different scenarios using graphs helped highlight the considerable variation in environmental costs and element rankings between the various scenarios.

Moreover, the second part demonstrated how the environmental costs of the various building elements among different scenarios and calculation cases contribute to the total cost. It was clear that the ranking of the building elements with the highest and lowest values and percentages of environmental costs stayed the same in the first and third scenarios despite the value difference. However, there was a more significant difference between the minimum and the other two scenarios. The reason for this is the difference in the main environmental cost components, as the ADPE, which plays a significant role in maximum and minimum scenarios, is negligible in the minimum scenario. This is because the minimum monetary value of ADPE emissions in Table 11 is negligible compared to the maximum and mean values. Furthermore, the floor slab with the highest environmental costs among most calculation cases in maximum and mean scenarios have only slightly different values in different calculation cases because their emissions values, mostly from phase A, are the dominants, so they have only changed relatively. Furthermore, BP_h_2 is one of the building elements with the highest environmental cost value and percentage across most scenarios and calculation cases. This is primarily attributed to the significant high environmental costs associated with concrete and damp insulation in phase A of the material life cycle and the high emissions value of Extruded polystyrene in phases B and C. Also, wood-based materials, such as cross-laminated timber and coniferous lumber, demonstrated high environmental costs in calculation case two but low in calculation case three. This is because wood materials have negative emissions in the production phase and higher dominant emissions in the end-of-life phase regarding GWP emissions. Finally, in most calculation cases across all scenarios, W_alu_2 has the lowest percentage of environmental costs to the total price despite possessing a high environmental cost value. This is because of the considerably high LCC of the building element.

Afterward, the individual proportion of each mid-point impact category used in this study to the overall environmental cost was assessed. Despite this variability, the GWP consistently stood out as the impact category with the highest contribution, averaging 71.0% maximum, 87.5% minimum, and 72.0% mean scenario. Therefore, it remains insufficient to consider only the GWP when calculating environmental costs, as different impact categories can still considerably impact the environmental costs, as illustrated in the previous paragraphs.

Finally, the CO2 price implemented by the German government on fossil fuels was compared with the environmental costs in the three scenarios. This comparison was a crucial step in the analysis, as it aimed to determine if the CO2 price is representative of the environmental costs. The comparison outcome has varied significantly between different scenarios due to the considerable variation of monetary factors. The CO2 price overrepresented the environmental costs of all building elements in the minimum scenario. However, it failed to cover 100% of the building elements' environmental costs in the maximum and mean scenarios, making it controversial to use the CO2 price solely to represent the environmental costs.

Using different scenarios in the analysis creates a decision room, a space where different scenarios can be considered and decisions can be made. This decision room will be used differently based on the various positions of each decision maker, as some may use the minimum scenario calculations, increasing the LCC dominance in decision-making to use certain materials with lower LCC. Justifying their material decision by claiming that they have chosen the most cost-efficient and environmentally friendly materials while resolutely believing that they have made the best economic choices. On the other hand, there will be those who will use the maximum scenario calculations in their decision-making for the most cost-efficient and environmentally friendly materials. They can utterly understand the significance and the severity of environmental changes, and it is better to consider the maximum possible environmental costs before it becomes too late.

Nevertheless, it is essential to mention that the calculation of the environmental costs in the maximum scenario is based on the Methodological Convention for the Determination of Environmental Costs, developed by the German environmental agency, for the GWP and AP values and can be considerably relevant to the German market (Matthey & Bünge, 2020). Therefore, considering this information and the previously mentioned facts about the current environmental situation, using the monetary factors from the maximum scenario is recommended when calculating the environmental costs.

5 Conclusion and Recommendations

The research presented in the master's thesis offers a comprehensive understanding of monetary valuation. This is achieved through an extensive literature review highlighting previous studies and methods used to calculate the environmental costs of various materials using monetary values. Moreover, developing a case study within the German context has enabled us to better understand how monetary valuation can influence building elements. In order to offer a clear and summarized outcome for future researchers, the anticipated output will function as a guide for concluding the accomplishments of this research endeavor in the fifth and final chapter.

5.1 Conclusion

The research has meticulously fulfilled its aim and objectives by addressing the research questions through the different chapters. The following paragraphs will summarize how the research could effectively attain its aim and objectives, providing significant insights into the monetary valuation methods of environmental factors in building design in Germany.

The first objective: to provide an in-depth understanding of monetary valuation and emphasize its significance in selecting the most cost-efficient building elements in the design phase by estimating environmental costs in a database of varying construction typologies of building components and implementing different scenarios and calculation cases.

- The first objective has successfully answered the first and second research questions in section 1.3. This could be accomplished by conducting an extensive literature review on monetary valuation. It yielded crucial insights into the topic, including the main different approaches for internalizing environmental emissions, as well as the established regulations and conducted studies within Germany in section 2.2.

- Moreover, the significance of the environmental costs estimated by using monetary valuation methods to consider more sustainable design options could be determined in sections 4.1 and 4.2 by calculating the environmental costs of different building elements and ranking the building elements of the same group from most, to least cost-efficient based on the total cost per m2, which represents the summation of LCC and

environmental costs. This approach has clearly illustrated how environmental costs can influence building element selections. Also, depending on the scenario and the calculation case, environmental costs can represent between -17% and 72% of the total costs of the building elements used in this study.

- Furthermore, the use of maximum, minimum, and mean scenarios was beneficial in highlighting how the use of different monetary values within the used range can impact the choice of the most efficient building elements and that even the minimum values of environmental costs still influence the ranking of the most cost-efficient building element. This could highlight the advocate influence of environmental costs.

The second objective: to highlight the significance of different midpoint impact categories in determining the overall environmental cost by showing the contribution of each impact category to the total environmental costs.

- The second objective successfully answers the third research question in Chapter 4, section 4.3, by determining the proportion and contribution of the midpoint impact categories in all three scenarios to the total environmental costs. The results have shown that GWP is the main contributor among all different scenarios and materials. However, the percentage of contribution varies across different building elements and scenarios. This part showed clearly how crucial it is to consider other environmental impacts in our calculations and not to rely solely on GWP, as it does not account for 100% of the environmental costs, and its proportion varies significantly.

4. **The third objective**: to Compare the current established German CO2 price with the outcome of the monetary valuation in the research's case study to assess the CO2 price representation of the environmental costs.

- This objective has answered the fourth and last research question in chapter four, section 4.4, by comparing the environmental costs of each building element with the CO2 price used for fossil fuels in Germany. The values vary significantly across different scenarios, where the CO2 represents less than 70% of the environmental costs, approximately 700% in the minimum scenario, and less variation with the environmental cost values of the mean scenario, where the majority of values lie between 73 and 108%. The results have shown a vast playroom based on each scenario to decide whether the CO2 price can be used in the construction industry to account for the environmental costs.

- Based on the prevailing environmental circumstances, the author argues that the price of CO2 fails to encompass 100% of associated environmental expenses among different scenarios. The contribution of various impact categories to environmental costs and the studies to determine maximum monetary values, especially the GWP values introduced by the environment agency of the German government, support this assertion, indicating that additional environmental impacts need to be considered. Also, the analysis showed that using GWP only to calculate the environmental costs is insufficient.

5.2 Research Gaps and Limitations

Finally, based on this research approach, scope of work, and assumptions, the research limitations will be created to help guide future researchers to have a better contribution to this topic and to be able to follow different approaches. Moreover, addressing the research gaps and limitations can yield impactful results. The research gaps can be summarized in the following paragraphs:

First and foremost, the scope of the study was the building elements from the cost group 300, according to the DIN 276. Therefore, considering building elements from cost group KG 400 in this study can provide a broader range of elements with different material combinations to apply to the case study and to determine if the building elements from cost group 400 are affected the same way as building elements from the cost group 300 by the environmental costs.

Furthermore, the study conducted in this research was based on the German construction market, with LCA calculations based solely on ÖKOBAUDAT as the only reference. However, using additional references for calculating the emissions can close the calculation gap for various emissions, which were absent in the ÖKOBAUDAT, and provide more precise results regarding the emissions exerted by each building material.

Moreover, the research's case study did not include the operational energy use in building elements and considered only the following LCA phases: A1-A3, B4, C3, and C4. However, LCA phase B6 remains a crucial aspect of the building life cycle. Therefore, it is essential for future researchers to consider energy use by calculating LCA for phase B6, following the same approach used in this research, to investigate how it can influence the outcome and the ranking of the most cost-efficient building elements.

Finally, the case study is representative of different building elements from various German districts that were collected to focus on several elements with varying combinations of material. Applying the case to the building level instead of working only at the element level to determine how the choices for one element sometimes affect other elements and to find if the final results of the most efficient building elements will vary.

5.3 Summary

The first part of this chapter highlighted how the research could successfully achieve its aim and objectives. This part summarizes the progress achieved in each chapter.

The first chapter provides an overview of the current environmental situation, highlighting the problem of not using a standard monetary valuation method in Germany and ignoring several impact categories. It also lists the research questions that the study aims to answer in the different chapters, as well as the aim and objectives of the research. Finally, it demonstrates the thesis's structure by explaining each chapter's content.

The second chapter introduced the findings of previous studies on different topics, such as LCA and monetary valuation, in order to provide an in-depth understanding of these terms and a better understanding of the German context. Also, it emphasized the monetary factors used by the previous studies to create the maximum, minimum, and mean scenarios for calculating environmental costs.

The third chapter presented the research methodology in detail, explaining research activities to achieve the research aim and objectives. There were mainly three main steps, and the first one was collecting the dataset and choosing the reference to create the case study within the German context. The second step was understanding monetary valuation and creating the maximum, minimum, and mean scenarios based on the monetary factors collected from the previous studies in chapter two. The last step is to group similar building elements, calculate the LCA and LCC of the building element of the used dataset, and create different calculation cases using economic factors such as yearly price increase and discount rate.

The fourth chapter introduced the results of the case study alongside an explanation and discussion to show the influence of environmental costs on the total price of different construction materials. The results were analyzed as follows: first, the total price of similar building elements was compared, and the ranking of the most to least cost-efficient building element was investigated to demonstrate how the environmental costs could influence the ranking different from the LCC. The second section compared the environmental costs of the

building elements to show which building element was responsible for the highest environmental costs in Euros per m2 and as a percentage of the total price per m2 in each scenario and among each calculation case. The third section was essential to show the proportion of each impact category to the total environmental costs to show that considering only the GWP while ignoring the other environmental impact in calculating the environmental costs is insufficient. The final section compared the environmental costs of building elements in the three scenarios with the CO2 price used by the German government to find if it can represent the environmental costs of this material.

The fifth and final chapter has shown how the research could achieve its objectives and answer the research questions by highlighting its findings. Also, it has provided the research limitations that need to be investigated by future researchers. Finally, it has summarized the five main chapters of the research to show what was introduced in each chapter.

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Appendices

Table 15 Building materials

Bauelemente	**Materialbezeichnung**	
PRO_h_1	Blecheindeckung (Edelstahl)	4.2.01 Edelstahlbleche
	Strukturierte Trennlage (Kunststofffaservlies)	6.6.04 PE/PP-Vlies
	Schalung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Unterdeckbahn	6.6.01 Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m)
	Schalung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Konstruktionsvollholz	3.1.02 Konstruktionsvollholz (Durchschnitt DE)
	Zellulosefaser-Einblasdämmung	2.11.01 Zellulose-Einblas-Dämmung
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Mineralwolle (Innenausbau)	2.1.01 Mineralwolle (Innenausbau-Dämmung)

	GKF-Platte	1.3.13 Gipskartonplatte (Feuerschutz)
PRO_h_2	Dachziegel (Biberschwanz; ca. 70 kg/m²)	1.3.10 Dachziegel
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Unterdeckbahn	6.6.01 Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m)
	Schalung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Brettschichtholz	3.1.04 Brettschichtholz - Standardformen (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
PRO_ uh_ 1	Blecheindeckung (Edelstahl)	4.2.01 Edelstahlbleche
	Strukturierte Trennlage (Kunststofffaservlies)	6.6.04 PE/PP-Vlies

	Schalung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Unterdeckbahn	6.6.01 Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m)
	Schalung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Konstruktionsvollholz	3.1.02 Konstruktionsvollholz (Durchschnitt DE)
PRO_ uh_ 2	Dachziegel (Biberschwanz; ca. 70 kg/m²)	1.3.10 Dachziegel
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Unterdeckbahn	6.6.01 Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m)
	Schalung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Brettschichtholz	3.1.04 Brettschichtholz - Standardformen (Durchschnitt DE)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)

	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
FROmas_1	PVC-Dachbahn	6.3.02 PVC-Dachbahnen (Dicke 0.0012 m)
	Glasvlies Dach	6.6.04 Glasvlies
	Polystyroldämmung Flachdach, EPS 035	2.2.01 EPS-Hartschaum (Styropor ®) für Decken/Böden und als Perimeterdämmung B/P035
	Bitumendachbahn	6.3.01 Bitumenbahnen V60 (Dicke 0,005 m)
	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Bewehrungsstahl
FRO mas _2	Vegetationssubstrat, 750 kg/m³	1.3.19 Vegetationssubstrat
	Filtervlies, PP	6.6.04 PE/PP-Vlies
	Drainmatte, 2,8 kg/m²	6.6.03 PE-Noppenfolie zur Abdichtung (Dicke 0,00125 m)
	Schutzvlies, 300 g/m²	6.6.04 PE/PP-Vlies
	Dachabdichtung, wurzelfest	6.3.01 Bitumenbahnen PYE-PV 200 S5 ns (geschiefert)
	Bitumendachbahn	6.3.01 Bitumenbahnen V60 (Dicke 0,005 m)
	Polystyroldämmung, XPS (DA)	2.3.01 XPS-Dämmstoff
	Bitumendachbahn	6.3.01 Bitumenbahnen V60 (Dicke 0,005 m)
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C 30/37; 2% 4.1.02 Bewehrungsstahl

	Innenputz	Kalk-Gips-Innenputz
FRO wood _1	PVC-Dachbahn	6.3.02 PVC-Dachbahnen (Dicke 0.0012 m)
	Glasvlies Dach	6.6.04 Glasvlies
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Konstruktionsvollholz	3.1.02 Konstruktionsvollholz (Durchschnitt DE)
	Zellulosefaser-Einblasdämmung	2.11.01 Zellulose-Einblas-Dämmung
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	GKF-Platte	1.3.13 Gipskartonplatte (Feuerschutz)
FRO wood _2	Vegetationssubstrat, 750 kg/m³	1.3.19 Vegetationssubstrat
	Filtervlies, PP	6.6.04 PE/PP-Vlies
	Drainmatte, 2,8 kg/m²	6.6.03 PE-Noppenfolie zur Abdichtung (Dicke 0,00125 m)
	Schutzvlies, 300 g/m²	6.6.04 PE/PP-Vlies
	Dachabdichtung, wurzelfest	6.3.01 Bitumenbahnen PYE-PV 200 S5 ns (geschiefert)
	Bitumendachbahn	6.3.01 Bitumenbahnen V60 (Dicke 0,005 m)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)

	Unterdeckbahn	6.6.01 Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Luftschicht	
	Brettschichtholz	3.1.04 Brettschichtholz - Standardformen (Durchschnitt DE)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
FRO wood _3	PVC-Dachbahn	6.3.02 PVC-Dachbahnen (Dicke 0.0012 m)
	Glasvlies Dach	6.6.04 Glasvlies
	Polystyroldämmung Flachdach, EPS 035	2.2.01 EPS-Hartschaum (Styropor ®) für Decken/Böden und als Perimeterdämmung B/P035
	Bitumendachbahn	6.3.01 Bitumenbahnen V60 (Dicke 0,005 m)
	Brettsperrholz	3.1.05 Brettsperrholz (Durchschnitt DE)
	Vegetationssubstrat, 750 kg/m³	1.3.19 Vegetationssubstrat

FRO wood _4	Filtervlies, PP	6.6.04 PE/PP-Vlies
	Drainmatte, 2,8 kg/m²	6.6.03 PE-Noppenfolie zur Abdichtung (Dicke 0,00125 m)
	Schutzvlies, 300 g/m²	6.6.04 PE/PP-Vlies
	Dachabdichtung, wurzelfest	6.3.01 Bitumenbahnen PYE-PV 200 S5 ns (geschiefert)
	Bitumendachbahn	6.3.01 Bitumenbahnen V60 (Dicke 0,005 m)
	Polystyroldämmung, XPS (DA)	2.3.01 XPS-Dämmstoff
	Bitumendachbahn	6.3.01 Bitumenbahnen V60 (Dicke 0,005 m)
	Brettsperrholz	3.1.05 Brettsperrholz (Durchschnitt DE)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
EWmas_1	Innenputz	Kalk-Gips-Innenputz
	Hochlochziegel (99,6/0,4)	9,6% 1.3.02 Mauerziegel; 0,4% 1.4.02 Zementmörtel
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden -Dämmung)
	WDVS Verklebung und Beschichtung	WDVS Verklebung und Beschichtung Kratzputz mineralisch
EW mas _2	Innenputz	Kalk-Gips-Innenputz
	Hochlochziegel, Dämmstoff gefüllt (99,6/0,4)	99,6% 1.3.02 Mauerziegel (Dämmstoff gefüllt); 0,4% 1.4.02 Zementmörtel
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durch schnitt DE)

	Vorhangfassade (Faserzementplatten)	Faserzement platte
EW mas _3	Innenputz	Kalk-Gips-Innenputz
	Kalksandstein (99,2/0,8)	99.2% 1.3.01 Kalksandstein; 0.8% 1.4.02 Zementmörtel
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden -Dämmung)
	WDVS Verklebung und Beschichtung	WDVS Verklebung und Beschichtung Kratzputz mineralisch
EW mas _4	Innenputz	Kalk-Gips-Innenputz
	Kalksandstein (95/5)	95% 1.3.01 Kalksandstein; 5% 1.4.02 Zementmörtel
	Holzfaserdämmplatte (VF)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durch schnitt DE)
	Winddichtheitsbahn	6.6.01 Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m)
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durch schnitt DE)
	Vorhangfassade (Faserzementplatten)	1.3.12 Faserzement platte
EW mas _5	Innenputz	Kalk-Gips-Innenputz
	Porenbeton P2 04 (99,2/0,8)	9.2% 1.3.03 Porenbeton P2 04 unbewehrt; 0.8% 1.4.02 Zementmörtel
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden -Dämmung)

	WDVS Verklebung und Beschichtung	WDVS Verklebung und Beschichtung Kratzputz mineralisch
EW mas _6	Innenputz	Kalk-Gips-Innenputz
	Porenbeton P4 05 (95/5)	95% 1.3.03 Porenbeton P4 05 unbewehrt; 5% 1.4.02 Zementmörtel
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durch schnitt DE)
	Vorhangfassade (Faserzementplatten)	Faserzement platte
EW mas _7	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Be wehrungsstahl
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden -Dämmung)
	WDVS Verklebung und Beschichtung	WDVS Verklebung und Beschichtung Kratzputz mineralisch
EW mas _8	Innenputz	Kalk-Gips-Innenputz
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstah
	Holzfaserdämmplatte (VF)	2.10.01 Holzfaserdämm platte (Nassverfahren)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durch schnitt DE)
	Winddichtheitsbahn	6.6.01 Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m)
	Konterlattung	3.1.01 Nadelschnittholz - getrocknet (Durch schnitt DE)

	Vorhangfassade (Faserzementplatten)	1.3.12 Faserzement platte
EW wood _1	GKF-Platte	Gipskartonplatte (Feuerschutz)
	PE-Folie Wand	Dampfbremse PE (Dicke 0,0002 m) Dampfbremse sd ≥ 2m
	Zellulosefaser-Einblasdämmung	Zellulose-Ein blas-Dämmung
	Konstruktionsvollholz	Konstruktionsvollholz (Durchschnitt DE)
	Gipsfaserplatte	Gipsfaserplatte (Dicke 0,01 m)
	Winddichtheitsbahn	Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m) Windbremse sd ≤ 0,3m
	Konterlattung	Nadelschnittholz - getrocknet (Durch schnitt DE), Holz Fichte Lattung versetzt (30/50; 30/80)-Hinterlüftung
	Vorhangfassade (Annahme: Laubholz, natur)	Laubschnittholz - getrocknet Holz Lärche Aussenwandverkleidung
EW wood _2	Gipsfaserplatte	Gipsfaserplatte (Dicke 0,01 m)
	Lattung	Nadelschnittholz - getrocknet (Durch schnitt DE), Holz Fichte Querlattung (a=400) bzw. Lattung versetzt
	Holzfaserdämmung (Innenausbau)	Holzfaserdämmplatte (Nassverfahren)
	PE-Folie Wand	Dampfbremse PE (Dicke 0,0002 m)
	OSB-Platte	Oriented Strand Board (Durchschnitt DE)

	Holzfaserdämmung (Innenausbau)	Holzfaserdämmplatte (Nassverfahren)
	Konstruktionsvollholz	Konstruktionsvollholz (Durchschnitt DE)
	Gipsfaserplatte	Gipsfaserplatte (Dicke 0,01 m)
	Winddichtheitsbahn	Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m) Windbremse sd ≤ 0,3m
	Konterlattung	Nadelschnittholz - getrocknet (Durch schnitt DE)
	Vorhangfassade (Faserzementplatten)	Faserzementplatte
EWwood_3	GKF-Platte	Gipskartonplatte (Feuerschutz)
	Brettsperrholz	Brettsperrholz (Durchschnitt DE)
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
	WDVS Verklebung und Beschichtung	WDVS Verklebung und Beschichtung Kratzputz mineralisch
EW wood _4	Gipsfaserplatte	Gipsfaserplatte (Dicke 0,01 m)
	Lattung	Nadelschnittholz - getrocknet (Durch schnitt DE)
	Holzfaserdämmung (Innenausbau)	Holzfaserdämmplatte (Nassverfahren)
	Brettsperrholz	Brettsperrholz (Durchschnitt DE)

	Lattung	Nadelschnittholz - getrocknet (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	Holzfaserdämmplatte (Nassverfahren)
	Gipsfaserplatte	Gipsfaserplatte (Dicke 0,01 m)
	Winddichtheitsbahn	Unterspannbahn PE gewebeverstärkt (Dicke 0,00015 m)
	Konterlattung	Nadelschnittholz - getrocknet (Durchschnitt DE)
	Vorhangfassade (Faserzementplatten)	Faserzementplatte
SW mas _1	Innenputz	Kalk-Gips-Innenputz
	Hochlochziegel (51,6/48/0,4), Trennwand	51.6% 1.3.02 Mauerziegel; 48% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 0,4% 1.4.02 Zementmörtel
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW mas _2	Innenputz	Kalk-Gips-Innenputz
	Hochlochziegel (51,6/48/0,4), Trennwand	51.6% 1.3.02 Mauerziegel; 48% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 0,4% 1.4.02 Zementmörtel
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW mas _3	Innenputz	Kalk-Gips-Innenputz
	Kalksandstein (99,2/0,8)	99.2% 1.3.01 Kalksandstein; 0.8% 1.4.02 Zementmörtel

	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW mas _4	Innenputz	Kalk-Gips-Innenputz
	Kalksandstein (95/5)	95% 1.3.01 Kalksandstein; 5% 1.4.02 Zementmörtel
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW mas _5	Innenputz	Kalk-Gips-Innenputz
	Porenbeton P2 04 (99,2/0,8)	9.2% 1.3.03 Porenbeton P2 04 unbewehrt; 0.8% 1.4.02 Zementmörtel
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW mas _6	Innenputz	Kalk-Gips-Innenputz
	Porenbeton P4 05 (95/5)	95% 1.3.03 Porenbeton P4 05 unbewehrt; 5% 1.4.02 Zementmörtel
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW mas _7	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Be wehrungsstahl
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW mas _8	Innenputz	Kalk-Gips-Innenputz
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstah
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)

SWwood_1	GKF-Platte	Gipskartonplatte (Feuerschutz)
	Zellulosefaser-Einblasdämmung	
	Konstruktionsvollholz	
	GKF-Platte	Gipskartonplatte (Feuerschutz)
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW wood _2	Gipsfaserplatte	
	Lattung	
	Holzfaserdämmung (Innenausbau)	
	OSB-Platte	
	Holzfaserdämmung (Innenausbau)	
	Konstruktionsvollholz	
	OSB-Platte	
	Gipsfaserplatte	
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW wood _3	Brettsperrholz	
	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
SW wood _4	Gipsfaserplatte	
	Holzfaserdämmung (Innenausbau)	
	Lattung	
	Brettsperrholz	

	Mineralwolle (Außenwand)	Mineralwolle (Fassaden-Dämmung)
IW mas _1	Innenputz	Kalk-Gips-Innenputz
	Hochlochziegel (99,6/0,4)	9,6% 1.3.02 Mauerziegel; 0,4% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
IW mas _2	Innenputz	Kalk-Gips-Innenputz
	Hochlochziegel (98/2)	98% 1.3.02 Mauerziegel; 2% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
IW mas _3	Innenputz	Kalk-Gips-Innenputz
	Kalksandstein (99,2/0,8)	99.2% 1.3.01 Kalksandstein; 0.8% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
IW mas _4	Innenputz	Kalk-Gips-Innenputz
	Kalksandstein (95/5)	95% 1.3.01 Kalksandstein; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
IW mas _5	Innenputz	Kalk-Gips-Innenputz
	Porenbeton P2 04 (99,2/0,8)	9.2% 1.3.03 Porenbeton P2 04 unbewehrt; 0.8% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
IWmas_6	Innenputz	Kalk-Gips-Innenputz

	Porenbeton P4 05 (95/5)	95% 1.3.03 Porenbeton P4 05 unbewehrt; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
IW mas _7	Stahlbeton C20/25 (99/1)	
IW mas _8	Innenputz	Kalk-Gips-Innenputz
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstah
	Innenputz	Kalk-Gips-Innenputz
IW wood _1	GKF-Platte	Gipskartonplatte (Feuerschutz)
	Zellulosefaser-Einblasdämmung	
	Konstruktionsvollholz	
	GKF-Platte	Gipskartonplatte (Feuerschutz)
IW wood _2	Gipsfaserplatte	
	OSB-Platte	
	Holzfaserdämmung (Innenausbau)	
	Konstruktionsvollholz	
	OSB-Platte	
	Gipsfaserplatte	
IW wood _3	Brettsperrholz	
	Gipsfaserplatte	

IW wood _4	Holzfaserdämmung (Innenausbau)	
	Lattung	
	Brettsperrholz	
	Lattung	
	Holzfaserdämmung (Innenausbau)	
	Gipsfaserplatte	
CW _h _1	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Hochlochziegel (99,6/0,4)	9,6% 1.3.02 Mauerziegel; 0,4% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
CW_h_2	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)

	Außenputz	Kalkzement Putz mörtel (de)
	Hochlochziegel, Dämmstoff gefüllt (99,6/0,4)	99,6% 1.3.02 Mauerziegel (Dämmstoff gefüllt); 0,4% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
CW _h _3	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Kalksandstein (99,2/0,8)	99.2% 1.3.01 Kalksandstein; 0.8% 1.4.02 Zementmörtel
CW _h _4	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)

	Kalksandstein (95/5)	95% 1.3.01 Kalksandstein; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
CW_h_5	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Porenbeton P2 04 (99,2/0,8)	9.2% 1.3.03 Porenbeton P2 04 unbewehrt; 0.8% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
CW_h_6	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Porenbeton P4 05 (95/5)	95% 1.3.03 Porenbeton P4 05 unbewehrt; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz

CW _h _7	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Stahlbeton C20/25 (99/1)	
CW _h _8	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstah
	Innenputz	Kalk-Gips-Innenputz
CW _uh _1	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Hochlochziegel (99,6/0,4)	9,6% 1.3.02 Mauerziegel; 0,4% 1.4.02 Zementmörtel

	Innenputz	Kalk-Gips-Innenputz
CW _uh _2	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Hochlochziegel, Dämmstoff gefüllt (99,6/0,4)	99,6% 1.3.02 Mauerziegel (Dämmstoff gefüllt); 0,4% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
CW_uh_3	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Kalksandstein (99,2/0,8)	99.2% 1.3.01 Kalksandstein; 0.8% 1.4.02 Zementmörtel
CW _uh _4	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung

	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Kalksandstein (95/5)	95% 1.3.01 Kalksandstein; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
CW _uh _5	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)
	Porenbeton P2 04 (99,2/0,8)	9.2% 1.3.03 Porenbeton P2 04 unbewehrt; 0.8% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
CW _uh _6	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	PE-HD-Flächenabdichtung	PE-HD mit PP Vlies zu Abdichtung
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Außenputz	Kalkzement Putz mörtel (de)

	Porenbeton P4 05 (95/5)	95% 1.3.03 Porenbeton P4 05 unbewehrt; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
CW _uh _7	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Stahlbeton C20/25 (99/1)	
CW_uh_8	Noppenbahn	PE-Noppenfolie zur Abdichtung (Dicke 0.00125 m)
	Grundierung (Bitumenvoranstrich, lösemittelhaltig)	Bitumen Kaltkle ber (60% Bitumen, 23%LM, 17% Wasser)
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstah
	Innenputz	Kalk-Gips-Innenputz
SCW _h _1	Mineralwolle (Außenwand)	
	Hochlochziegel (51,6/48/0,4), Trennwand	51.6% 1.3.02 Mauerziegel; 48% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 0,4% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW _h _2	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	Hochlochziegel (51,6/48/0,4), Trennwand	51.6% 1.3.02 Mauerziegel; 48% 1.4.01 Beton der Druckfestigkeitsklasse C

		20/25; 0,4% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW_h_3	Mineralwolle (Außenwand)	
	Kalksandstein (99,2/0,8)	99.2% 1.3.01 Kalksandstein; 0.8% 1.4.02 Zementmörtel
SCW_h_4	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	Kalksandstein (95/5)	95% 1.3.01 Kalksandstein; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW_h_5	Mineralwolle (Außenwand)	
	Porenbeton P2 04 (99,2/0,8)	9.2% 1.3.03 Porenbeton P2 04 unbewehrt; 0.8% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW_h_6	Luftschicht	
	Porenbeton P4 05 (95/5)	95% 1.3.03 Porenbeton P4 05 unbewehrt; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW_h_7	Mineralwolle (Außenwand)	
	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Bewehrungsstahl

SCW _h _8	Polystyroldämmung, XPS (KW)	XPS-Dämmstoff
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstah
	Innenputz	Kalk-Gips-Innenputz
SCW _uh _1	Hochlochziegel (51,6/48/0.4), Trennwand	51.6% 1.3.02 Mauerziegel; 48% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 0,4% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW_uh_2	Hochlochziegel (51,6/48/0.4), Trennwand	51.6% 1.3.02 Mauerziegel;48% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 0,4% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW _uh _3	Kalksandstein (99,2/0,8)	99.2% 1.3.01 Kalksandstein; 0.8% 1.4.02 Zementmörtel
SCW _uh _4	Kalksandstein (95/5)	95% 1.3.01 Kalksandstein; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW _uh _5	Porenbeton P2 04 (99,2/0,8)	9.2% 1.3.03 Porenbeton P2 04 unbewehrt; 0.8% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz

SCW _uh _6	Porenbeton P4 05 (95/5)	95% 1.3.03 Porenbeton P4 05 unbewehrt; 5% 1.4.02 Zementmörtel
	Innenputz	Kalk-Gips-Innenputz
SCW _uh _7	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C20/25; 1% 4.1.02 Bewehrungsstahl
SCW _uh _8	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstah
	Innenputz	Kalk-Gips-Innenputz
FL mas _1	Trockenestrich	1.3.14 Trockenestrich (Gipskartonplatte) (Dicke 0,025 m)
	Polystyroldämmung Decke und Boden, EPS, WLS 040	2.2.01 EPS-Hartschaum (Styropor ®) für Decken/Böden und als Perimeterdämmung B/P040
	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Bewehrungsstahl
FL mas _2	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Holzfaserdämmung (TSD)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstahl

	Innenputz	1.4.04 Kalk-Gips-Innenputz
FL wood _1	Trockenestrich	1.3.14 Trockenestrich (Gipskartonplatte) (Dicke 0,025 m)
	Polystyroldämmung Decke und Boden, EPS, WLS 040	2.2.01 EPS-Hartschaum (Styropor ®) für Decken/Böden und als Perimeterdämmung B/P040
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Schüttung, Porenbetongranulat	1.3.03 Porenbeton Granulat
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Schalung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Konstruktionsvollholz	3.1.02 Konstruktionsvollholz (Durchschnitt DE)
FLwood_2	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Holzfaserdämmung (TSD)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Brettschichtholz	3.1.04 Brettschichtholz - Standardformen (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)

	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
FL wood _3	Trockenestrich	1.3.14 Trockenestrich (Gipskartonplatte) (Dicke 0,025 m)
	Polystyroldämmung Decke und Boden, EPS, WLS 040	2.2.01 EPS-Hartschaum (Styropor ®) für Decken/Böden und als Perimeterdämmung B/P040
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Schüttung, Porenbetongranulat	1.3.03 Porenbeton Granulat
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Brettsperrholz	3.1.05 Brettsperrholz (Durchschnitt DE)
FL wood _4	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Holzfaserdämmung (TSD)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Schüttung, Perlite 0-3	1.2.07 Perlite 0-3
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Brettsperrholz	3.1.05 Brettsperrholz (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durch schnitt DE)

	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
TFL mas _1	Mineralwolle (Boden)	2.1.01 Mineralwolle (Boden-Dämmung)
	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Bewehrungsstahl
TFL mas _2	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstahl
	Innenputz	1.4.04 Kalk-Gips-Innenputz
TFL wood _1	GKF-Platte	1.3.13 Gipskartonplatte (Feuerschutz)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Konstruktionsvollholz	3.1.02 Konstruktionsvollholz (Durchschnitt DE
	Zellulosefaser-Einblasdämmung	2.11.01 Zellulose-Einblas-Dämmung
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)

	Mineralwolle (Innenausbau)	2.1.01 Mineralwolle (Innenausbau-Dämmung)
	GKF-Platte	1.3.13 Gipskartonplatte (Feuerschutz)
TFL wood _2	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Brettschichtholz	3.1.04 Brettschichtholz - Standardformen (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Luftschicht, ruhend	
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
TFL wood _3	Mineralwolle (Boden)	2.1.01 Mineralwolle (Boden-Dämmung)
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Brettsperrholz	3.1.05 Brettsperrholz (Durchschnitt DE)
TFLwood_4	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)

	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Brettsperrholz	3.1.05 Brettsperrholz (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
CFL mas _1	Trockenestrich	1.3.14 Trockenestrich (Gipskartonplatte) (Dicke 0,025 m)
	Mineralwolle (Boden)	2.1.01 Mineralwolle (Boden-Dämmung)
	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Bewehrungsstahl
	Mineralwolle (Innenausbau)	2.1.01 Mineralwolle (Innenausbau-Dämmung)
	WDVS Verklebung und Beschichtung	2.21.01 WDVS Verklebung und Beschichtung Kratzputz mineralisch
CFL mas _2	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Holzfaserdämmung (TSD)	2.10.01 Holzfaserdämmplatte (Nassverfahren)

	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstahl
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	WDVS Verklebung und Beschichtung	2.21.01 WDVS Verklebung und Beschichtung Kratzputz mineralisch
CFL wood _1	Trockenestrich	1.3.14 Trockenestrich (Gipskartonplatte) (Dicke 0,025 m)
	Mineralwolle (Boden)	2.1.01 Mineralwolle (Boden-Dämmung)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Konstruktionsvollholz	3.1.02 Konstruktionsvollholz (Durchschnitt DE
	Zellulosefaser-Einblasdämmung	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	GKF-Platte	1.3.13 Gipskartonplatte (Feuerschutz)
CFL wood _2	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Holzfaserdämmung (TSD)	2.10.01 Holzfaserdämmplatte (Nassverfahren)

	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Brettschichtholz	3.1.04 Brettschichtholz - Standardformen (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	OSB-Platte	3.2.04 Oriented Strand Board (Durchschnitt DE)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
CFL wood _3	Trockenestrich	1.3.14 Trockenestrich (Gipskartonplatte) (Dicke 0,025 m)
	Mineralwolle (Boden)	2.1.01 Mineralwolle (Boden-Dämmung)
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Schüttung, Porenbetongranulat	1.3.03 Porenbeton Granulat
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Brettsperrholz	3.1.05 Brettsperrholz (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Mineralwolle (Innenausbau)	2.1.01 Mineralwolle (Innenausbau-Dämmung)
	GKF-Platte	1.3.13 Gipskartonplatte (Feuerschutz)
CFLwood_4	Zementestrich	1.4.03 Zementestrich

	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Holzfaserdämmung (TSD)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Schüttung, Perlite 0-3	1.2.07 Perlite 0-3
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Brettsperrholz	3.1.05 Brettsperrholz (Durchschnitt DE)
	Lattung	3.1.01 Nadelschnittholz - getrocknet (Durchschnitt DE)
	Holzfaserdämmung (Innenausbau)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	Gipsfaserplatte	1.3.13 Gipsfaserplatte (Dicke 0,01 m)
BP _h _1	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Mineralwolle (Boden)	2.1.01 Mineralwolle (Boden-Dämmung)
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Bewehrungsstahl
	PE-Folie Bodenplatte	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Polystyroldämmung, XPS (BO)	2.3.01 XPS-Dämmstoff

	Sauberkeitsschicht	1.4.01 Beton der Druckfestigkeitsklasse C 20/25
BP _h _2	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Holzfaserdämmung (TSD)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstahl
	PE-Folie Bodenplatte	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Polystyroldämmung, XPS (BO)	2.3.01 XPS-Dämmstoff
	Sauberkeitsschicht	1.4.01 Beton der Druckfestigkeitsklasse C 20/25
BP _uh _1	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Polystyroldämmung Decke und Boden, EPS, WLS 040	2.2.01 EPS-Hartschaum (Styropor ®) für Decken/Böden und als Perimeterdämmung B/P040
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Stahlbeton C20/25 (99/1)	99% 1.4.01 Beton der Druckfestigkeitsklasse C 20/25; 1% 4.1.02 Bewehrungsstahl

	Sauberkeitsschicht	1.4.01 Beton der Druckfestigkeitsklasse C 20/25
BP _uh _2	Zementestrich	1.4.03 Zementestrich
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Holzfaserdämmung (TSD)	2.10.01 Holzfaserdämmplatte (Nassverfahren)
	PE-Folie Decke	6.6.03 Dampfbremse PE (Dicke 0,0002 m)
	Stahlbeton C30/37 (98/2)	98% 1.4.01 Beton der Druckfestigkeitsklasse C30/37; 2% 4.1.02 Bewehrungsstah
	Sauberkeitsschicht	1.4.01 Beton der Druckfestigkeitsklasse C 20/25
W alu _1	WDG, dreifach	7.2.01 Dreifachverglasung (Dicke: 0,036 m)
	Aluminium-Blendrahmen, thermisch getrennt	7.1.06 Aluminium-Rahmenprofil, thermisch getrennt, pulverbeschichtet
	Aluminium-Flügelrahmen, thermisch getrennt	7.1.06 Aluminium-Flügelrahmenprofil, thermisch getrennt, pulverbeschichtet
	Fugendichtungsband	7.3.04 Fugendichtungsbänder Gewebebänder
	Fenstergriff	7.4.07 Fenstergriff
	Fensterbeschlag, Drehkippfenster	7.4.02 Fensterbeschlag für Drehkippfenster (Aluminium)

W alu _2	WDG, dreifach	7.2.01 Dreifachverglasung (Dicke: 0,036 m)
	Aluminium-Blendrahmen, thermisch getrennt	7.1.06 Aluminium-Rahmenprofil, thermisch getrennt, pulverbeschichtet
	Aluminium-Flügelrahmen, thermisch getrennt	7.1.06 Aluminium-Flügelrahmenprofil, thermisch getrennt, pulverbeschichtet
	Fugendichtungsband	7.3.04 Fugendichtungsbänder Gewebebänder
	Fenstergriff	7.4.07 Fenstergriff
	Fensterbeschlag, Drehkippfenster	7.4.02 Fensterbeschlag für Drehkippfenster (Aluminium)
W plas _1	WDG, dreifach	7.2.01 Dreifachverglasung (Dicke: 0,036 m)
	Kunststoff-Blendrahmen	7.1.09 Blendrahmen PVC-U
	Kunststoff-Flügelrahmen	7.1.09 Flügelrahmen PVC-U
	Fugendichtungsband	7.3.04 Fugendichtungsbänder Gewebebänder
	Fenstergriff	7.4.07 Fenstergriff
	Fensterbeschlag, Drehkippfenster	7.4.02 Fensterbeschlag für Drehkippfenster (Aluminium)
W plas _2	WDG, dreifach	7.2.01 Dreifachverglasung (Dicke: 0,036 m)
	Kunststoff-Blendrahmen	7.1.09 Blendrahmen PVC-U

	Kunststoff-Flügelrahmen	7.1.09 Flügelrahmen PVC-U
	Fugendichtungsband	7.3.04 Fugendichtungsbänder Gewebebänder
	Fenstergriff	7.4.07 Fenstergriff
	Fensterbeschlag, Drehkippfenster	7.4.02 Fensterbeschlag für Drehkippfenster (Aluminium)
W wood _1	WDG, dreifach	7.2.01 Dreifachverglasung (Dicke: 0,036 m)
	Holz-Blendrahmen	7.1.01 Holz-Blendrahmen
	Holz-Flügelrahmen	7.1.01 Holz - Flügelrahmen
	Fugendichtungsband	7.3.04 Fugendichtungsbänder Gewebebänder
	Fenstergriff	7.4.07 Fenstergriff
	Fensterbeschlag, Drehkippfenster	7.4.02 Fensterbeschlag für Drehkippfenster (Aluminium)
W wood _2	WDG, dreifach	7.2.01 Dreifachverglasung (Dicke: 0,036 m)
	Holz-Blendrahmen	7.1.01 Holz-Blendrahmen
	Holz-Flügelrahmen	7.1.01 Holz - Flügelrahmen
	Fugendichtungsband	7.3.04 Fugendichtungsbänder Gewebebänder
	Fenstergriff	7.4.07 Fenstergriff

	Fensterbeschlag, Drehkippfenster	7.4.02 Fensterbeschlag für Drehkippfenster (Aluminium)
W wood _3	Einfachverglasung	7.2.01 Fensterglas einfach
	WDG, zweifach	7.2.01 Isolierglas 2-Scheiben
	Holz-Blendrahmen	7.1.01 Holz-Blendrahmen
	Holz-Flügelrahmen	7.1.01 Holz - Flügelrahmen
	Fugendichtungsband	7.3.04 Fugendichtungsbänder Gewebebänder
	Fenstergriff	7.4.07 Fenstergriff
	Fensterbeschlag, Doppelflügelfenster	7.4.02 Fensterbeschlag für Doppelflügelfenster
	Fensterbeschlag, Drehkippfenster	7.4.02 Fensterbeschlag für Drehkippfenster (Aluminium)
W wood _4	Einfachverglasung	7.2.01 Fensterglas einfach
	WDG, zweifach	7.2.01 Isolierglas 2-Scheiben
	Holz-Blendrahmen	7.1.01 Holz-Blendrahmen
	Holz-Flügelrahmen	7.1.01 Holz - Flügelrahmen
	Fugendichtungsband	7.3.04 Fugendichtungsbänder Gewebebänder
	Fenstergriff	7.4.07 Fenstergriff
	Fensterbeschlag, Doppelflügelfenster	7.4.02 Fensterbeschlag für Doppelflügelfenster

	Fensterbeschlag, Drehkippfenster	7.4.02 Fensterbeschlag für Drehkippfenster (Aluminium)

Table 16 Building elements maximum scenario values

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
PRO_h_1	EC	16.95	0.00	2.53	0.00	0.96	223.94	470.93	244.39	715.32
	Impact categories contribution to EC	7%	0%	1%	0%	0%	92%			
	EC with Price Variation	115.42	0.00	2.74	0.01	1.05	281.89	470.93	401.11	872.04
	EC with Discount Rate	-13.61	0.00	2.47	0.00	0.93	205.96	470.93	195.75	666.68
	Price Variation&Discount Rate	33.44	0.00	2.57	0.00	0.98	233.65	470.93	270.63	741.56
PRO_h_2	EC	56.69	0.00	2.54	0.01	1.99	68.68	459.70	129.91	589.61
	Impact categories contribution to EC	44%	0%	2%	0%	2%	53%			
	EC with Price Variation	247.53	0.00	3.25	0.01	2.31	126.65	459.70	379.74	839.44
	EC with Discount Rate	-2.54	0.00	2.32	0.01	1.89	50.69	459.70	52.37	512.07
	Price Variation&Discount Rate	88.64	0.00	2.66	0.01	2.04	78.39	459.70	171.74	631.44

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
PRO_uh_1	EC	12.09	0.00	2.03	0.00	0.76	80.77	313.02	95.65	408.67
	Impact categories contribution to EC	13%	0%	2%	0%	1%	84%			
	EC with Price Variation	82.98	0.00	2.09	0.00	0.78	138.72	313.02	224.57	537.59
	EC with Discount Rate	-9.91	0.00	2.01	0.00	0.76	62.79	313.02	55.64	368.66
	Price Variation&Discount Rate	23.96	0.00	2.04	0.00	0.77	90.48	313.02	117.24	430.26
PRO_uh_2	EC	32.25	0.00	1.69	0.00	1.33	68.62	397.33	103.90	501.23
	Impact categories contribution to EC	31%	0%	2%	0%	1%	66%			
	EC with Price Variation	127.69	0.00	1.92	0.01	1.44	126.58	397.33	257.63	654.96
	EC with Discount Rate	2.63	0.00	1.62	0.00	1.30	50.63	397.33	56.19	453.52
	Price Variation&Discount Rate	48.23	0.00	1.73	0.00	1.35	78.32	397.33	129.64	526.97
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FRO_mass_1	EC	80.33	0.00	2.69	0.02	4.18	0.72	224.34	87.95	312.29
	Impact categories	91%	0%	3%	0%	5%	1%			

	contribution to EC									
	EC with Price Variation	145.85	0.00	4.17	0.05	5.01	1.38	224.34	156.46	380.80
	EC with Discount Rate	59.99	0.00	2.23	0.02	3.93	0.52	224.34	66.68	291.02
	Price Variation&Discount Rate	91.30	0.00	2.94	0.03	4.32	0.83	224.34	99.42	323.76
FRO_mass_2	EC	97.46	0.00	3.63	0.04	2.38	0.29	493.10	103.80	596.90
	Impact categories contribution to EC	94%	0%	3%	0%	2%	0%			
	EC with Price Variation	143.81	0.00	4.71	0.09	2.96	0.35	493.10	151.93	645.03
	EC with Discount Rate	83.08	0.00	3.29	0.03	2.20	0.27	493.10	88.86	581.96
	Price Variation&Discount Rate	105.22	0.00	3.81	0.05	2.48	0.30	493.10	111.86	604.96
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FRO_wood_1	EC	31.99	0.00	1.78	0.01	1.13	193.55	254.34	228.46	482.80
	Impact categories contribution to EC	14%	0%	1%	0%	0%	85%			
	EC with Price Variation	136.21	0.00	2.93	0.02	1.77	194.18	254.34	335.12	589.46
	EC with Discount Rate	-0.35	0.00	1.42	0.01	0.93	193.35	254.34	195.36	449.70

	Price Variation&Discount Rate	49.44	0.00	1.97	0.01	1.24	193.66	254.34	246.32	500.66
FRO_wood_2	EC	62.41	0.00	3.47	0.03	2.63	68.77	588.56	137.31	725.87
	Impact categories contribution to EC	45%	0%	3%	0%	2%	50%			
	EC with Price Variation	319.14	0.00	4.66	0.07	3.23	126.76	588.56	453.85	1042.41
	EC with Discount Rate	-17.26	0.00	3.10	0.02	2.44	50.77	588.56	39.07	627.63
	Price Variation&Discount Rate	105.40	0.00	3.67	0.04	2.73	78.48	588.56	190.31	778.87
FRO_wood_3	EC	58.55	0.00	2.87	0.02	4.14	0.68	189.36	66.26	255.62
	Impact categories contribution to EC	88%	0%	4%	0%	6%	1%			
	EC with Price Variation	221.45	0.00	4.22	0.05	4.87	1.33	189.36	231.92	421.28
	EC with Discount Rate	7.99	0.00	2.45	0.02	3.92	0.48	189.36	14.85	204.21
	Price Variation&Discount Rate	85.82	0.00	3.09	0.03	4.26	0.79	189.36	94.00	283.36
FRO_wood_4	EC	64.87	0.00	4.10	0.04	3.00	0.21	415.30	72.23	487.53
	Impact categories contribution to EC	90%	0%	6%	0%	4%	0%			
	EC with Price Variation	322.85	0.00	5.18	0.09	3.56	0.28	415.30	331.96	747.26

	EC with Discount Rate	-15.19	0.00	3.77	0.03	2.83	0.19	415.30	-8.38	406.92
	Price Variation&Discount Rate	108.06	0.00	4.28	0.05	3.10	0.23	415.30	115.72	531.02
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
EW_mas_1	EC	50.42	0.00	3.58	0.01	1.05	1.55	309.24	56.62	365.86
	Impact categories contribution to EC	89%	0%	6%	0%	2%	3%			
	EC with Price Variation	65.41	0.00	5.30	0.02	1.62	2.44	309.24	74.79	384.03
	EC with Discount Rate	44.79	0.00	2.95	0.01	0.85	1.23	309.24	49.83	359.07
	Price Variation&Discount Rate	53.18	0.00	3.89	0.01	1.15	1.72	309.24	59.95	369.19
EW_mas_2	EC	45.16	0.00	2.71	0.01	1.09	120.30	406.05	169.27	575.32
	Impact categories contribution to EC	27%	0%	2%	0%	1%	71%			
	EC with Price Variation	45.54	0.00	3.05	0.01	1.31	120.34	406.05	170.25	576.30
	EC with Discount Rate	45.05	0.00	2.61	0.01	1.01	120.29	406.05	168.96	575.01
	Price Variation&Discount Rate	45.23	0.00	2.77	0.01	1.12	120.31	406.05	169.43	575.48
EW_mas_3	EC	83.07	0.00	5.72	0.02	1.65	2.99	264.03	93.45	357.48

	Impact categories contribution to EC	89%	0%	6%	0%	2%	3%			
	EC with Price Variation	122.82	0.00	9.83	0.03	2.62	4.77	264.03	140.07	404.10
	EC with Discount Rate	68.84	0.00	4.28	0.02	1.31	2.33	264.03	76.78	340.81
	Price Variation&Discount Rate	90.20	0.00	6.45	0.02	1.83	3.31	264.03	101.81	365.84
EW_mas_4	EC	68.82	0.00	3.21	0.01	1.72	188.92	402.90	262.67	665.57
	Impact categories contribution to EC	26%	0%	1%	0%	1%	72%			
	EC with Price Variation	199.78	0.00	5.37	0.01	2.12	246.94	402.90	454.22	857.12
	EC with Discount Rate	28.17	0.00	2.53	0.01	1.59	170.91	402.90	203.22	606.12
	Price Variation&Discount Rate	90.75	0.00	3.57	0.01	1.79	198.63	402.90	294.74	697.64
EW_mas_5	EC	71.87	0.00	3.41	0.02	1.28	3.14	263.58	79.72	343.30
	Impact categories contribution to EC	90%	0%	4%	0%	2%	4%			
	EC with Price Variation	108.81	0.00	6.09	0.03	2.23	5.53	263.58	122.70	386.28
	EC with Discount Rate	60.40	0.00	2.58	0.01	0.98	2.40	263.58	66.38	329.96
	Price Variation&Discount Rate	78.05	0.00	3.86	0.02	1.44	3.54	263.58	86.92	350.50

EW_mas_6	EC	75.85	0.00	1.94	0.01	1.19	121.00	329.43	199.98	529.41
	Impact categories contribution to EC	38%	0%	1%	0%	1%	61%			
	EC with Price Variation	84.09	0.00	2.43	0.01	1.44	121.03	329.43	209.00	538.43
	EC with Discount Rate	73.29	0.00	1.78	0.01	1.11	120.99	329.43	197.18	526.61
	Price Variation&Discount Rate	77.23	0.00	2.02	0.01	1.23	121.01	329.43	201.49	530.92
EW_mas_7	EC	57.49	0.00	4.81	0.01	1.48	1.57	297.09	65.36	362.45
	Impact categories contribution to EC	88%	0%	7%	0%	2%	2%			
	EC with Price Variation	90.57	0.00	8.31	0.02	2.41	2.83	297.09	104.15	401.24
	EC with Discount Rate	47.22	0.00	3.73	0.01	1.19	1.17	297.09	53.32	350.41
	Price Variation&Discount Rate	63.03	0.00	5.40	0.02	1.63	1.78	297.09	71.85	368.94
EW_mas_8	EC	84.01	0.00	4.11	0.02	2.61	188.89	592.80	279.63	872.43
	Impact categories contribution to EC	30%	0%	1%	0%	1%	68%			
	EC with Price Variation	208.14	0.00	4.83	0.02	2.97	246.86	592.80	462.82	1055.62
	EC with Discount Rate	45.48	0.00	3.88	0.02	2.50	170.90	592.80	222.78	815.58

	Price Variation&Discount Rate	104.79	0.00	4.23	0.02	2.67	198.60	592.80	310.30	903.10
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
EW_wood_1	EC	13.95	0.00	2.23	0.00	1.44	211.77	228.84	229.39	458.23
	Impact categories contribution to EC	6%	0%	1%	0%	1%	92%			
	EC with Price Variation	121.80	0.00	3.24	0.01	2.08	253.24	228.84	380.35	609.19
	EC with Discount Rate	-19.68	0.00	1.87	0.00	1.20	196.37	228.84	179.77	408.61
	Price Variation&Discount Rate	32.05	0.00	2.41	0.01	1.55	219.35	228.84	255.36	484.20
EW_wood_2	EC	38.90	0.00	2.16	0.01	1.62	331.82	430.48	374.51	804.99
	Impact categories contribution to EC	10%	0%	1%	0%	0%	89%			
	EC with Price Variation	197.07	0.00	2.90	0.01	1.94	389.78	430.48	591.71	1022.19
	EC with Discount Rate	-10.19	0.00	1.93	0.01	1.51	313.84	430.48	307.10	737.58
	Price Variation&Discount Rate	65.38	0.00	2.29	0.01	1.67	341.53	430.48	410.88	841.36
EW_wood_3	EC	43.74	0.00	4.64	0.01	1.66	1.52	287.89	51.58	339.47
	Impact categories	85%	0%	9%	0%	3%	3%			

	contribution to EC									
	EC with Price Variation	149.55	0.00	7.02	0.02	2.30	2.42	287.89	161.31	449.20
	EC with Discount Rate	9.64	0.00	3.77	0.01	1.42	1.19	287.89	16.04	303.93
	Price Variation&Discount Rate	61.78	0.00	5.08	0.01	1.77	1.68	287.89	70.32	358.21
EW_wood_4	EC	42.94	0.00	3.97	0.02	2.92	188.75	620.13	238.58	858.71
	Impact categories contribution to EC	18%	0%	2%	0%	1%	79%			
	EC with Price Variation	350.09	0.00	4.57	0.02	3.19	246.72	620.13	604.59	1224.72
	EC with Discount Rate	-52.39	0.00	3.78	0.02	2.83	170.76	620.13	124.99	745.12
	Price Variation&Discount Rate	94.36	0.00	4.07	0.02	2.96	198.46	620.13	299.86	919.99
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SW_mas_1	EC	23.24	0.00	0.98	0.00	0.40	0.08	129.25	24.70	153.95
	Impact categories contribution to EC	94%	0%	4%	0%	2%	0%			
	EC with Price Variation	24.40	0.00	1.34	0.00	0.58	0.11	129.25	26.44	155.69
	EC with Discount Rate	22.84	0.00	0.86	0.00	0.34	0.07	129.25	24.11	153.36

	Price Variation&Discount Rate	23.44	0.00	1.04	0.00	0.43	0.08	129.25	25.00	154.25
SW_mas_2	EC	40.52	0.00	1.74	0.00	0.70	0.14	191.69	43.10	234.79
	Impact categories contribution to EC	94%	0%	4%	0%	2%	0%			
	EC with Price Variation	43.20	0.00	2.47	0.00	1.04	0.20	191.69	46.91	238.60
	EC with Discount Rate	39.69	0.00	1.51	0.00	0.60	0.12	191.69	41.92	233.61
	Price Variation&Discount Rate	40.97	0.00	1.86	0.00	0.76	0.15	191.69	43.74	235.43
SW_mas_3	EC	22.01	0.00	0.96	0.00	0.30	0.09	90.92	23.36	114.28
	Impact categories contribution to EC	94%	0%	4%	0%	1%	0%			
	EC with Price Variation	26.60	0.00	1.79	0.00	0.37	0.13	90.92	28.90	119.82
	EC with Discount Rate	20.55	0.00	0.69	0.00	0.27	0.08	90.92	21.60	112.52
	Price Variation&Discount Rate	22.79	0.00	1.10	0.00	0.31	0.10	90.92	24.30	115.22
SW_mas_4	EC	49.51	0.00	2.13	0.00	0.70	0.30	144.96	52.65	197.61
	Impact categories contribution to EC	94%	0%	4%	0%	1%	1%			
	EC with Price Variation	60.06	0.00	4.01	0.00	0.92	0.39	144.96	65.38	210.34

	EC with Discount Rate	46.24	0.00	1.54	0.00	0.63	0.28	144.96	48.70	193.66
	Price Variation&Discount Rate	51.28	0.00	2.44	0.00	0.73	0.32	144.96	54.78	199.74
SW_mas_5	EC	17.12	0.00	0.51	0.00	0.23	0.17	103.17	18.03	121.20
	Impact categories contribution to EC	95%	0%	3%	0%	1%	1%			
	EC with Price Variation	18.50	0.00	0.72	0.00	0.30	0.18	103.17	19.70	122.87
	EC with Discount Rate	16.70	0.00	0.44	0.00	0.21	0.17	103.17	17.51	120.68
	Price Variation&Discount Rate	17.35	0.00	0.54	0.00	0.24	0.17	103.17	18.31	121.48
SW_mas_6	EC	81.22	0.00	1.93	0.01	0.97	0.96	245.01	85.09	330.10
	Impact categories contribution to EC	95%	0%	2%	0%	1%	1%			
	EC with Price Variation	85.77	0.00	2.63	0.01	1.26	1.00	245.01	90.67	335.68
	EC with Discount Rate	79.81	0.00	1.71	0.01	0.88	0.95	245.01	83.35	328.36
	Price Variation&Discount Rate	81.98	0.00	2.05	0.01	1.02	0.97	245.01	86.02	331.03
SW_mas_7	EC	22.25	0.00	1.09	0.00	0.55	0.09	149.35	23.99	173.34
	Impact categories contribution to EC	93%	0%	5%	0%	2%	0%			

	EC with Price Variation	23.95	0.00	1.28	0.00	0.63	0.11	149.35	25.98	175.33
	EC with Discount Rate	21.73	0.00	1.03	0.00	0.53	0.09	149.35	23.38	172.73
	Price Variation&Discount Rate	22.54	0.00	1.12	0.00	0.56	0.10	149.35	24.32	173.67
SW_mas_8	EC	64.70	0.00	3.03	0.01	1.59	0.27	256.44	69.60	326.04
	Impact categories contribution to EC	93%	0%	4%	0%	2%	0%			
	EC with Price Variation	68.42	0.00	3.47	0.01	1.77	0.31	256.44	73.97	330.41
	EC with Discount Rate	63.55	0.00	2.89	0.01	1.53	0.26	256.44	68.25	324.69
	Price Variation&Discount Rate	65.32	0.00	3.10	0.01	1.62	0.28	256.44	70.34	326.78
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SW_wood_1	EC	7.00	0.00	0.54	0.00	0.24	0.02	98.38	7.81	106.19
	Impact categories contribution to EC	90%	0%	7%	0%	3%	0%			
	EC with Price Variation	27.96	0.00	0.77	0.00	0.33	0.02	98.38	29.08	127.46
	EC with Discount Rate	0.47	0.00	0.46	0.00	0.22	0.02	98.38	1.16	99.54
	Price Variation&Discount Rate	10.52	0.00	0.58	0.00	0.26	0.02	98.38	11.38	109.76

SW_wood_2	EC	36.21	0.00	1.75	0.01	1.30	0.11	275.35	39.39	314.74
	Impact categories contribution to EC	92%	0%	4%	0%	3%	0%			
	EC with Price Variation	178.50	0.00	2.37	0.01	1.55	0.12	275.35	182.56	457.91
	EC with Discount Rate	-7.95	0.00	1.56	0.01	1.23	0.10	275.35	-5.05	270.30
	Price Variation&Discount Rate	60.04	0.00	1.86	0.01	1.35	0.11	275.35	63.36	338.71
SW_wood_3	EC	7.81	0.00	1.01	0.00	0.66	0.05	117.14	9.54	126.68
	Impact categories contribution to EC	82%	0%	11%	0%	7%	1%			
	EC with Price Variation	80.07	0.00	1.14	0.00	0.70	0.06	117.14	81.97	199.11
	EC with Discount Rate	-14.65	0.00	0.97	0.00	0.65	0.05	117.14	-12.99	104.15
	Price Variation&Discount Rate	19.92	0.00	1.04	0.00	0.67	0.05	117.14	21.67	138.81
SW_wood_4	EC	33.51	0.00	3.34	0.01	2.26	0.17	360.79	39.29	400.08
	Impact categories contribution to EC	85%	0%	9%	0%	6%	0%			
	EC with Price Variation	280.23	0.00	3.87	0.01	2.44	0.20	360.79	286.74	647.53
	EC with Discount Rate	-43.06	0.00	3.18	0.01	2.20	0.16	360.79	-37.50	323.29

	Price Variation&Discount Rate	74.82	0.00	3.43	0.01	2.29	0.17	360.79	80.72	441.51
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
IW_mas_1	EC	13.61	0.00	0.65	0.00	0.24	0.06	122.46	14.56	137.02
	Impact categories contribution to EC	93%	0%	4%	0%	2%	0%			
	EC with Price Variation	12.69	0.00	0.76	0.00	0.31	0.07	122.46	13.84	136.30
	EC with Discount Rate	13.89	0.00	0.62	0.00	0.22	0.06	122.46	14.79	137.25
	Price Variation&Discount Rate	13.46	0.00	0.67	0.00	0.25	0.06	122.46	14.44	136.90
IW_mas_2	EC	28.71	0.00	1.37	0.00	0.50	0.15	174.01	30.73	204.74
	Impact categories contribution to EC	93%	0%	4%	0%	2%	0%			
	EC with Price Variation	26.95	0.00	1.62	0.00	0.66	0.17	174.01	29.40	203.41
	EC with Discount Rate	29.26	0.00	1.29	0.00	0.46	0.14	174.01	31.15	205.16
	Price Variation&Discount Rate	28.42	0.00	1.41	0.00	0.53	0.15	174.01	30.51	204.52
IW_mas_3	EC	22.48	0.00	0.87	0.00	0.30	0.09	102.56	23.74	126.30
	Impact categories	95%	0%	4%	0%	1%	0%			

	contribution to EC									
	EC with Price Variation	26.64	0.00	1.63	0.00	0.37	0.13	102.56	28.77	131.33
	EC with Discount Rate	21.19	0.00	0.63	0.00	0.28	0.08	102.56	22.18	124.74
	Price Variation&Discount Rate	23.18	0.00	0.99	0.00	0.31	0.10	102.56	24.58	127.14
IW_mas_4	EC	50.47	0.00	1.94	0.00	0.70	0.30	148.28	53.41	201.69
	Impact categories contribution to EC	94%	0%	4%	0%	1%	1%			
	EC with Price Variation	59.67	0.00	3.63	0.00	0.90	0.37	148.28	64.57	212.85
	EC with Discount Rate	47.61	0.00	1.42	0.00	0.64	0.28	148.28	49.95	198.23
	Price Variation&Discount Rate	52.01	0.00	2.22	0.00	0.73	0.31	148.28	55.28	203.56
IW_mas_5	EC	17.60	0.00	0.42	0.00	0.23	0.17	118.02	18.41	136.43
	Impact categories contribution to EC	96%	0%	2%	0%	1%	1%			
	EC with Price Variation	18.30	0.00	0.53	0.00	0.29	0.17	118.02	19.29	137.31
	EC with Discount Rate	17.38	0.00	0.38	0.00	0.21	0.16	118.02	18.14	136.16
	Price Variation&Discount Rate	17.72	0.00	0.44	0.00	0.24	0.17	118.02	18.56	136.58
IW_mas_6	EC	43.96	0.00	0.98	0.00	0.55	0.48	171.18	45.98	217.16

	Impact categories contribution to EC	96%	0%	2%	0%	1%	1%			
	EC with Price Variation	45.90	0.00	1.29	0.00	0.71	0.50	171.18	48.40	219.58
	EC with Discount Rate	43.36	0.00	0.89	0.00	0.50	0.48	171.18	45.23	216.41
	Price Variation&Discount Rate	44.29	0.00	1.04	0.00	0.58	0.48	171.18	46.39	217.57
IW_mas_7	EC	21.29	0.00	0.94	0.00	0.52	0.09	128.76	22.85	151.61
	Impact categories contribution to EC	93%	0%	4%	0%	2%	0%			
	EC with Price Variation	22.15	0.00	1.01	0.00	0.57	0.10	128.76	23.84	152.60
	EC with Discount Rate	21.02	0.00	0.92	0.00	0.51	0.09	128.76	22.54	151.30
	Price Variation&Discount Rate	21.44	0.00	0.95	0.00	0.53	0.09	128.76	23.01	151.77
IW_mas_8	EC	55.67	0.00	2.41	0.01	1.35	0.23	250.99	59.66	310.65
	Impact categories contribution to EC	93%	0%	4%	0%	2%	0%			
	EC with Price Variation	57.76	0.00	2.63	0.01	1.48	0.25	250.99	62.13	313.12
	EC with Discount Rate	55.02	0.00	2.34	0.01	1.31	0.22	250.99	58.89	309.88
	Price Variation&Discount Rate	56.02	0.00	2.44	0.01	1.37	0.23	250.99	60.07	311.06

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
IW_wood_1	EC	4.47	0.00	0.32	0.00	0.18	0.01	77.28	4.99	82.27
	Impact categories contribution to EC	90%	0%	6%	0%	4%	0%			
	EC with Price Variation	23.97	0.00	0.43	0.00	0.23	0.01	77.28	24.64	101.92
	EC with Discount Rate	-1.57	0.00	0.29	0.00	0.17	0.01	77.28	-1.11	76.17
	Price Variation&Discount Rate	7.74	0.00	0.34	0.00	0.19	0.01	77.28	8.28	85.56
IW_wood_2	EC	46.02	0.00	2.04	0.01	1.61	0.13	224.77	49.82	274.59
	Impact categories contribution to EC	92%	0%	4%	0%	3%	0%			
	EC with Price Variation	207.45	0.00	2.64	0.01	1.88	0.14	224.77	212.13	436.90
	EC with Discount Rate	-4.07	0.00	1.86	0.01	1.53	0.13	224.77	-0.56	224.21
	Price Variation&Discount Rate	73.05	0.00	2.14	0.01	1.66	0.13	224.77	76.99	301.76
IW_wood_3	EC	7.90	0.00	1.00	0.00	0.73	0.05	110.08	9.68	119.76
	Impact categories contribution to EC	82%	0%	10%	0%	8%	1%			
	EC with Price Variation	90.59	0.00	1.03	0.00	0.75	0.06	110.08	92.43	202.51

	EC with Discount Rate	-17.76	0.00	0.99	0.00	0.72	0.05	110.08	-16.00	94.08
	Price Variation&Discount Rate	21.75	0.00	1.00	0.00	0.73	0.05	110.08	23.54	133.62
IW_wood_4	EC	46.93	0.00	3.57	0.01	2.54	0.19	439.35	53.24	492.59
	Impact categories contribution to EC	88%	0%	7%	0%	5%	0%			
	EC with Price Variation	316.92	0.00	4.09	0.01	2.78	0.21	439.35	324.02	763.37
	EC with Discount Rate	-36.86	0.00	3.41	0.01	2.46	0.18	439.35	-30.79	408.56
	Price Variation&Discount Rate	92.13	0.00	3.66	0.01	2.58	0.19	439.35	98.58	537.93
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CW_h_1	EC	61.38	0.00	2.86	0.01	2.13	1.77	373.16	68.15	441.31
	Impact categories contribution to EC	90%	0%	4%	0%	3%	3%			
	EC with Price Variation	67.35	0.00	3.54	0.02	3.20	2.73	373.16	76.84	450.00
	EC with Discount Rate	59.01	0.00	2.62	0.01	1.75	1.41	373.16	64.80	437.96
	Price Variation&Discount Rate	62.51	0.00	2.98	0.01	2.32	1.95	373.16	69.77	442.93

CW_h_2	EC	81.49	0.00	2.62	0.01	2.50	1.71	374.12	88.33	462.45
	Impact categories contribution to EC	92%	0%	3%	0%	3%	2%			
	EC with Price Variation	129.38	0.00	3.66	0.02	3.90	2.68	374.12	139.64	513.76
	EC with Discount Rate	64.76	0.00	2.25	0.01	1.99	1.35	374.12	70.37	444.49
	Price Variation&Discount Rate	89.98	0.00	2.80	0.01	2.75	1.89	374.12	97.44	471.56
CW_h_3	EC	130.28	0.00	3.37	0.02	3.27	1.77	291.76	138.71	430.47
	Impact categories contribution to EC	94%	0%	2%	0%	2%	1%			
	EC with Price Variation	229.63	0.00	6.19	0.02	5.11	2.81	291.76	243.77	535.53
	EC with Discount Rate	96.19	0.00	2.43	0.01	2.59	1.39	291.76	102.62	394.38
	Price Variation&Discount Rate	147.73	0.00	3.86	0.02	3.60	1.96	291.76	157.17	448.93
CW_h_4	EC	167.25	0.00	4.61	0.02	3.87	2.04	378.81	177.78	556.59
	Impact categories contribution to EC	94%	0%	3%	0%	2%	1%			
	EC with Price Variation	280.92	0.00	8.44	0.03	5.97	3.12	378.81	298.47	677.28
	EC with Discount Rate	128.40	0.00	3.35	0.02	3.11	1.65	378.81	136.52	515.33

	Price Variation&Discount Rate	187.17	0.00	5.27	0.02	4.25	2.24	378.81	198.95	577.76
CW_h_5	EC	87.54	0.00	1.98	0.01	2.17	2.21	325.23	93.92	419.15
	Impact categories contribution to EC	93%	0%	2%	0%	2%	2%			
	EC with Price Variation	115.00	0.00	2.84	0.02	3.41	3.34	325.23	124.61	449.84
	EC with Discount Rate	78.51	0.00	1.70	0.01	1.76	1.83	325.23	83.80	409.03
	Price Variation&Discount Rate	92.28	0.00	2.12	0.01	2.39	2.41	325.23	99.21	424.44
CW_h_6	EC	101.26	0.00	2.16	0.01	2.57	2.15	335.76	108.15	443.91
	Impact categories contribution to EC	94%	0%	2%	0%	2%	2%			
	EC with Price Variation	153.99	0.00	3.30	0.02	4.00	3.11	335.76	164.43	500.19
	EC with Discount Rate	83.02	0.00	1.77	0.01	2.06	1.80	335.76	88.65	424.41
	Price Variation&Discount Rate	110.56	0.00	2.36	0.01	2.83	2.33	335.76	118.09	453.85
CW_h_7	EC	92.62	0.00	2.38	0.01	3.12	0.18	276.84	98.31	375.15
	Impact categories contribution to EC	94%	0%	2%	0%	3%	0%			
	EC with Price Variation	162.71	0.00	3.25	0.01	4.67	0.24	276.84	170.88	447.72

	EC with Discount Rate	68.49	0.00	2.07	0.01	2.55	0.16	276.84	73.28	350.12
	Price Variation&Discount Rate	104.95	0.00	2.54	0.01	3.40	0.19	276.84	111.09	387.93
CW_h_8	EC	145.64	0.00	4.45	0.02	4.37	0.38	382.18	154.87	537.05
	Impact categories contribution to EC	94%	0%	3%	0%	3%	0%			
	EC with Price Variation	226.21	0.00	5.54	0.03	6.12	0.45	382.18	238.34	620.52
	EC with Discount Rate	117.95	0.00	4.06	0.02	3.74	0.36	382.18	126.12	508.30
	Price Variation&Discount Rate	159.81	0.00	4.64	0.02	4.69	0.39	382.18	169.55	551.73
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CW_uh_1	EC	48.49	0.00	1.83	0.01	1.84	1.65	252.90	53.82	306.72
	Impact categories contribution to EC	90%	0%	3%	0%	3%	3%			
	EC with Price Variation	68.96	0.00	2.50	0.01	2.87	2.60	252.90	76.95	329.85
	EC with Discount Rate	41.23	0.00	1.60	0.01	1.46	1.30	252.90	45.60	298.50
	Price Variation&Discount Rate	52.15	0.00	1.95	0.01	2.02	1.83	252.90	57.96	310.86
CW_uh_2	EC	73.26	0.00	3.06	0.01	2.25	1.78	407.86	80.36	488.22

	Impact categories contribution to EC	91%	0%	4%	0%	3%	2%			
	EC with Price Variation	94.01	0.00	3.96	0.02	3.56	2.93	407.86	104.47	512.33
	EC with Discount Rate	66.30	0.00	2.77	0.01	1.81	1.39	407.86	72.29	480.15
	Price Variation&Discount Rate	76.87	0.00	3.21	0.01	2.48	1.98	407.86	84.55	492.41
CW_uh_3	EC	66.81	0.00	2.27	0.01	1.95	1.72	194.94	72.76	267.70
	Impact categories contribution to EC	92%	0%	3%	0%	3%	2%			
	EC with Price Variation	100.77	0.00	4.40	0.02	3.14	2.90	194.94	111.22	306.16
	EC with Discount Rate	55.75	0.00	1.59	0.01	1.55	1.32	194.94	60.22	255.16
	Price Variation&Discount Rate	72.63	0.00	2.63	0.01	2.16	1.92	194.94	79.35	274.29
CW_uh_4	EC	95.12	0.00	3.36	0.01	2.37	1.98	261.49	102.84	364.33
	Impact categories contribution to EC	92%	0%	3%	0%	2%	2%			
	EC with Price Variation	134.10	0.00	6.39	0.02	3.71	3.19	261.49	147.41	408.90
	EC with Discount Rate	82.51	0.00	2.40	0.01	1.93	1.57	261.49	88.41	349.90
	Price Variation&Discount Rate	101.78	0.00	3.87	0.01	2.60	2.19	261.49	110.46	371.95

CW_uh_5	EC	64.50	0.00	1.50	0.01	1.91	1.96	267.26	69.88	337.14
	Impact categories contribution to EC	92%	0%	2%	0%	3%	3%			
	EC with Price Variation	91.37	0.00	2.27	0.02	3.10	3.08	267.26	99.84	367.10
	EC with Discount Rate	55.64	0.00	1.24	0.01	1.51	1.58	267.26	59.98	327.24
	Price Variation&Discount Rate	69.13	0.00	1.63	0.01	2.12	2.16	267.26	75.05	342.31
CW_uh_6	EC	103.95	0.00	2.28	0.01	2.35	2.48	334.46	111.08	445.54
	Impact categories contribution to EC	94%	0%	2%	0%	2%	2%			
	EC with Price Variation	132.57	0.00	3.33	0.02	3.68	3.62	334.46	143.22	477.68
	EC with Discount Rate	94.55	0.00	1.94	0.01	1.91	2.10	334.46	100.51	434.97
	Price Variation&Discount Rate	108.88	0.00	2.46	0.01	2.58	2.68	334.46	116.61	451.07
CW_uh_7	EC	29.15	0.00	1.28	0.01	1.80	0.13	180.02	32.36	212.38
	Impact categories contribution to EC	90%	0%	4%	0%	6%	0%			
	EC with Price Variation	31.10	0.00	1.39	0.01	2.66	0.15	180.02	35.30	215.32
	EC with Discount Rate	28.52	0.00	1.24	0.01	1.51	0.12	180.02	31.40	211.42

	Price Variation&Discount Rate	29.48	0.00	1.30	0.01	1.95	0.13	180.02	32.86	212.88
CW_uh_8	EC	73.52	0.00	3.19	0.01	2.88	0.31	277.10	79.92	357.02
	Impact categories contribution to EC	92%	0%	4%	0%	4%	0%			
	EC with Price Variation	76.56	0.00	3.42	0.02	3.69	0.35	277.10	84.03	361.13
	EC with Discount Rate	72.55	0.00	3.12	0.01	2.58	0.30	277.10	78.57	355.67
	Price Variation&Discount Rate	74.04	0.00	3.23	0.02	3.02	0.32	277.10	80.63	357.73
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SCW_h_1	EC	31.89	0.00	2.31	0.00	0.67	0.12	139.87	34.99	174.86
	Impact categories contribution to EC	91%	0%	7%	0%	2%	0%			
	EC with Price Variation	38.49	0.00	3.50	0.00	1.02	0.18	139.87	43.19	183.06
	EC with Discount Rate	29.49	0.00	1.89	0.00	0.55	0.10	139.87	32.02	171.89
	Price Variation&Discount Rate	33.09	0.00	2.52	0.00	0.73	0.13	139.87	36.47	176.34
SCW_h_2	EC	70.34	0.00	1.99	0.01	1.30	0.16	217.38	73.79	291.17
	Impact categories	95%	0%	3%	0%	2%	0%			

	contribution to EC									
	EC with Price Variation	105.45	0.00	2.85	0.01	1.99	0.23	217.38	110.53	327.91
	EC with Discount Rate	58.27	0.00	1.71	0.01	1.06	0.13	217.38	61.17	278.55
	Price Variation&Discount Rate	76.51	0.00	2.14	0.01	1.42	0.17	217.38	80.25	297.63
SCW_h_3	EC	29.70	0.00	2.31	0.00	0.55	0.13	69.32	32.70	102.02
	Impact categories contribution to EC	91%	0%	7%	0%	2%	0%			
	EC with Price Variation	39.87	0.00	3.98	0.00	0.79	0.20	69.32	44.84	114.16
	EC with Discount Rate	26.18	0.00	1.73	0.00	0.46	0.11	69.32	28.48	97.80
	Price Variation&Discount Rate	31.50	0.00	2.60	0.00	0.59	0.14	69.32	34.84	104.16
SCW_h_4	EC	82.21	0.00	2.43	0.01	1.36	0.33	170.67	86.33	257.00
	Impact categories contribution to EC	95%	0%	3%	0%	2%	0%			
	EC with Price Variation	128.29	0.00	4.48	0.01	1.97	0.42	170.67	135.17	305.84
	EC with Discount Rate	66.63	0.00	1.78	0.01	1.14	0.30	170.67	69.85	240.52
	Price Variation&Discount Rate	90.25	0.00	2.78	0.01	1.47	0.34	170.67	94.84	265.51
SCW_h_5	EC	26.25	0.00	0.89	0.00	0.36	0.26	143.28	27.76	171.04

	Impact categories contribution to EC	95%	0%	3%	0%	1%	1%			
	EC with Price Variation	28.49	0.00	1.23	0.00	0.47	0.28	143.28	30.47	173.75
	EC with Discount Rate	25.46	0.00	0.77	0.00	0.33	0.26	143.28	26.82	170.10
	Price Variation&Discount Rate	26.64	0.00	0.95	0.00	0.38	0.26	143.28	28.24	171.52
SCW_h_6	EC	79.30	0.00	1.64	0.01	0.91	0.95	212.08	82.80	294.88
	Impact categories contribution to EC	96%	0%	2%	0%	1%	1%			
	EC with Price Variation	82.18	0.00	2.08	0.01	1.14	0.98	212.08	86.40	298.48
	EC with Discount Rate	78.40	0.00	1.50	0.01	0.84	0.94	212.08	81.68	293.76
	Price Variation&Discount Rate	79.78	0.00	1.71	0.01	0.95	0.96	212.08	83.40	295.48
SCW_h_7	EC	31.87	0.00	2.57	0.01	0.85	0.14	161.93	35.43	197.36
	Impact categories contribution to EC	90%	0%	7%	0%	2%	0%			
	EC with Price Variation	39.38	0.00	3.64	0.01	1.11	0.18	161.93	44.31	206.24
	EC with Discount Rate	29.15	0.00	2.18	0.00	0.76	0.12	161.93	32.21	194.14
	Price Variation&Discount Rate	33.22	0.00	2.76	0.01	0.90	0.15	161.93	37.03	198.96

SCW_h_8	EC	97.40	0.00	3.33	0.02	2.25	0.30	282.15	103.29	385.44
	Impact categories contribution to EC	94%	0%	3%	0%	2%	0%			
	EC with Price Variation	136.65	0.00	3.93	0.02	2.82	0.34	282.15	143.77	425.92
	EC with Discount Rate	83.94	0.00	3.12	0.01	2.04	0.28	282.15	89.40	371.55
	Price Variation&Discount Rate	104.29	0.00	3.44	0.02	2.35	0.30	282.15	110.40	392.55
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SCW_uh_1	EC	22.28	0.00	0.83	0.00	0.37	0.07	108.66	23.55	132.21
	Impact categories contribution to EC	95%	0%	4%	0%	2%	0%			
	EC with Price Variation	22.84	0.00	1.11	0.00	0.53	0.11	108.66	24.58	133.24
	EC with Discount Rate	22.10	0.00	0.75	0.00	0.32	0.06	108.66	23.24	131.90
	Price Variation&Discount Rate	22.37	0.00	0.88	0.00	0.40	0.08	108.66	23.73	132.39
SCW_uh_2	EC	38.60	0.00	1.44	0.00	0.64	0.13	158.76	40.82	199.58
	Impact categories contribution to EC	95%	0%	4%	0%	2%	0%			
	EC with Price Variation	39.60	0.00	1.92	0.00	0.92	0.19	158.76	42.64	201.40

	EC with Discount Rate	38.29	0.00	1.29	0.00	0.55	0.11	158.76	40.25	199.01
	Price Variation&Discount Rate	38.77	0.00	1.52	0.00	0.69	0.14	158.76	41.12	199.88
SCW_uh_3	EC	19.61	0.00	0.75	0.00	0.24	0.09	38.10	20.69	58.79
	Impact categories contribution to EC	95%	0%	4%	0%	1%	0%			
	EC with Price Variation	23.43	0.00	1.46	0.00	0.28	0.12	38.10	25.30	63.40
	EC with Discount Rate	18.42	0.00	0.53	0.00	0.22	0.07	38.10	19.26	57.36
	Price Variation&Discount Rate	20.25	0.00	0.87	0.00	0.24	0.09	38.10	21.46	59.56
SCW_uh_4	EC	47.59	0.00	1.83	0.00	0.64	0.29	112.03	50.36	162.39
	Impact categories contribution to EC	95%	0%	4%	0%	1%	1%			
	EC with Price Variation	56.46	0.00	3.46	0.00	0.81	0.37	112.03	61.10	173.13
	EC with Discount Rate	44.84	0.00	1.32	0.00	0.59	0.27	112.03	47.02	159.05
	Price Variation&Discount Rate	49.08	0.00	2.10	0.00	0.67	0.31	112.03	52.16	164.19
SCW_uh_5	EC	23.84	0.00	0.52	0.00	0.29	0.25	103.35	24.90	128.25
	Impact categories contribution to EC	96%	0%	2%	0%	1%	1%			

	EC with Price Variation	24.57	0.00	0.63	0.00	0.35	0.26	103.35	25.82	129.17
	EC with Discount Rate	23.62	0.00	0.49	0.00	0.27	0.25	103.35	24.62	127.97
	Price Variation&Discount Rate	23.97	0.00	0.54	0.00	0.30	0.25	103.35	25.06	128.41
SCW_uh_6	EC	79.30	0.00	1.64	0.01	0.91	0.95	212.08	82.80	294.88
	Impact categories contribution to EC	96%	0%	2%	0%	1%	1%			
	EC with Price Variation	82.18	0.00	2.08	0.01	1.14	0.98	212.08	86.40	298.48
	EC with Discount Rate	78.40	0.00	1.50	0.01	0.84	0.94	212.08	81.68	293.76
	Price Variation&Discount Rate	79.78	0.00	1.71	0.01	0.95	0.96	212.08	83.40	295.48
SCW_uh_7	EC	21.29	0.00	0.94	0.00	0.52	0.09	128.76	22.85	151.61
	Impact categories contribution to EC	93%	0%	4%	0%	2%	0%			
	EC with Price Variation	22.15	0.00	1.01	0.00	0.57	0.10	128.76	23.84	152.60
	EC with Discount Rate	21.02	0.00	0.92	0.00	0.51	0.09	128.76	22.54	151.30
	Price Variation&Discount Rate	21.44	0.00	0.95	0.00	0.53	0.09	128.76	23.01	151.77
SCW_uh_8	EC	62.78	0.00	2.73	0.01	1.53	0.27	223.51	67.32	290.83
	Impact categories	93%	0%	4%	0%	2%	0%			

	contribution to EC									
	EC with Price Variation	64.82	0.00	2.92	0.01	1.65	0.29	223.51	69.70	293.21
	EC with Discount Rate	62.15	0.00	2.67	0.01	1.49	0.26	223.51	66.58	290.09
	Price Variation&Discount Rate	63.12	0.00	2.76	0.01	1.55	0.27	223.51	67.72	291.23
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FL_mas_1	EC	27.57	0.00	1.17	0.00	0.80	0.10	149.08	29.65	178.73
	Impact categories contribution to EC	93%	0%	4%	0%	3%	0%			
	EC with Price Variation	31.76	0.00	1.31	0.01	0.89	0.12	149.08	34.07	183.15
	EC with Discount Rate	26.28	0.00	1.13	0.00	0.78	0.10	149.08	28.28	177.36
	Price Variation&Discount Rate	28.28	0.00	1.19	0.00	0.82	0.11	149.08	30.39	179.47
FL_mas_2	EC	72.25	0.00	3.00	0.01	1.66	193.20	258.22	270.12	528.34
	Impact categories contribution to EC	27%	0%	1%	0%	1%	72%			
	EC with Price Variation	94.06	0.00	3.63	0.01	1.98	193.22	258.22	292.90	551.12
	EC with Discount Rate	65.48	0.00	2.81	0.01	1.56	193.19	258.22	263.04	521.26

	Price Variation&Discount Rate	75.90	0.00	3.11	0.01	1.71	193.20	258.22	273.93	532.15
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FL_wood_1	EC	8.87	0.00	0.86	0.00	0.68	286.35	241.13	296.76	537.89
	Impact categories contribution to EC	3%	0%	0%	0%	0%	96%			
	EC with Price Variation	68.86	0.00	0.97	0.00	0.73	286.36	241.13	356.92	598.05
	EC with Discount Rate	-9.75	0.00	0.82	0.00	0.66	286.35	241.13	278.09	519.22
	Price Variation&Discount Rate	18.91	0.00	0.87	0.00	0.69	286.35	241.13	306.83	547.96
FL_wood_2	EC	56.63	0.00	2.74	0.01	1.96	193.14	339.61	254.49	594.10
	Impact categories contribution to EC	22%	0%	1%	0%	1%	76%			
	EC with Price Variation	234.86	0.00	3.60	0.01	2.36	193.16	339.61	434.00	773.61
	EC with Discount Rate	1.32	0.00	2.47	0.01	1.84	193.14	339.61	198.78	538.39
	Price Variation&Discount Rate	86.47	0.00	2.88	0.01	2.03	193.15	339.61	284.54	624.15
FL_wood_3	EC	18.27	0.00	1.86	0.01	1.41	286.41	312.88	307.96	620.84
	Impact categories	6%	0%	1%	0%	0%	93%			

	contribution to EC									
	EC with Price Variation	151.16	0.00	2.01	0.01	1.48	286.42	312.88	441.08	753.96
	EC with Discount Rate	-22.97	0.00	1.82	0.01	1.39	286.40	312.88	266.64	579.52
	Price Variation&Discount Rate	40.52	0.00	1.89	0.01	1.42	286.41	312.88	330.25	643.13
FL_wood_4	EC	84.38	0.00	4.76	0.01	3.20	386.12	381.55	478.48	860.03
	Impact categories contribution to EC	18%	0%	1%	0%	1%	81%			
	EC with Price Variation	350.12	0.00	5.50	0.02	3.55	386.15	381.55	745.33	1126.88
	EC with Discount Rate	1.91	0.00	4.53	0.01	3.10	386.11	381.55	395.66	777.21
	Price Variation&Discount Rate	128.88	0.00	4.88	0.01	3.26	386.12	381.55	523.16	904.71
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
TFL_mas_1	EC	45.46	0.00	4.40	0.01	1.22	0.10	159.38	51.19	210.57
	Impact categories contribution to EC	89%	0%	9%	0%	2%	0%			
	EC with Price Variation	47.45	0.00	4.57	0.01	1.33	0.11	159.38	53.46	212.84
	EC with Discount Rate	44.84	0.00	4.35	0.01	1.19	0.09	159.38	50.49	209.87

	Price Variation&Discount Rate	45.79	0.00	4.43	0.01	1.24	0.10	159.38	51.57	210.95
TFL_mas_2	EC	78.42	0.00	3.14	0.01	1.92	0.28	298.10	83.78	381.88
	Impact categories contribution to EC	94%	0%	4%	0%	2%	0%			
	EC with Price Variation	167.06	0.00	3.82	0.02	2.25	0.30	298.10	173.45	471.55
	EC with Discount Rate	50.91	0.00	2.93	0.01	1.81	0.27	298.10	55.95	354.05
	Price Variation&Discount Rate	93.26	0.00	3.26	0.01	1.97	0.28	298.10	98.79	396.89
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
TFL_wood_1	EC	15.02	0.00	1.10	0.00	0.78	0.06	276.24	16.96	293.20
	Impact categories contribution to EC	89%	0%	7%	0%	5%	0%			
	EC with Price Variation	97.08	0.00	1.30	0.01	0.87	0.06	276.24	99.31	375.55
	EC with Discount Rate	-10.45	0.00	1.04	0.00	0.75	0.05	276.24	-8.60	267.64
	Price Variation&Discount Rate	28.76	0.00	1.14	0.00	0.79	0.06	276.24	30.75	306.99
TFL_wood_2	EC	49.99	0.00	2.45	0.01	1.88	0.19	352.06	54.52	406.58
	Impact categories	92%	0%	4%	0%	3%	0%			

	contribution to EC									
	EC with Price Variation	247.06	0.00	3.12	0.01	2.18	0.20	352.06	252.58	604.64
	EC with Discount Rate	-11.17	0.00	2.24	0.01	1.78	0.18	352.06	-6.95	345.11
	Price Variation&Discount Rate	82.99	0.00	2.56	0.01	1.93	0.19	352.06	87.68	439.74
TFL_wood_3	EC	31.85	0.00	4.47	0.01	1.70	143.24	262.62	181.27	443.89
	Impact categories contribution to EC	18%	0%	2%	0%	1%	79%			
	EC with Price Variation	161.81	0.00	4.61	0.01	1.77	143.25	262.62	311.45	574.07
	EC with Discount Rate	-8.49	0.00	4.43	0.01	1.68	143.24	262.62	140.87	403.49
	Price Variation&Discount Rate	53.61	0.00	4.49	0.01	1.71	143.24	262.62	203.06	465.68
TFL_wood_4	EC	49.18	0.00	3.70	0.01	2.61	193.15	490.22	248.66	738.88
	Impact categories contribution to EC	20%	0%	1%	0%	1%	78%			
	EC with Price Variation	340.25	0.00	4.28	0.02	2.88	193.18	490.22	540.59	1030.81
	EC with Discount Rate	-41.15	0.00	3.52	0.01	2.53	193.14	490.22	158.05	648.27
	Price Variation&Discount Rate	97.92	0.00	3.79	0.01	2.66	193.16	490.22	297.54	787.76

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CFL_mas_1	EC	44.88	0.00	2.70	0.01	1.07	1.50	153.33	50.16	203.49
	Impact categories contribution to EC	89%	0%	5%	0%	2%	3%			
	EC with Price Variation	56.36	0.00	3.28	0.02	1.37	2.35	153.33	63.38	216.71
	EC with Discount Rate	40.76	0.00	2.49	0.01	0.97	1.19	153.33	45.41	198.74
	Price Variation&Discount Rate	46.94	0.00	2.80	0.01	1.13	1.65	153.33	52.53	205.86
CFL_mas_2	EC	101.25	0.00	4.09	0.02	2.34	194.62	442.73	302.33	745.06
	Impact categories contribution to EC	33%	0%	1%	0%	1%	64%			
	EC with Price Variation	198.62	0.00	5.48	0.03	3.02	195.48	442.73	402.63	845.36
	EC with Discount Rate	70.47	0.00	3.64	0.02	2.12	194.30	442.73	270.55	713.28
	Price Variation&Discount Rate	117.69	0.00	4.33	0.02	2.46	194.77	442.73	319.28	762.01
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CFL_wood_1	EC	18.86	0.00	1.50	0.01	0.88	143.21	348.73	164.46	513.19
	Impact categories	11%	0%	1%	0%	1%	87%			

	contribution to EC									
	EC with Price Variation	102.79	0.00	1.73	0.01	0.98	143.22	348.73	248.74	597.47
	EC with Discount Rate	-7.19	0.00	1.43	0.01	0.84	143.21	348.73	138.30	487.03
	Price Variation&Discount Rate	32.91	0.00	1.54	0.01	0.89	143.21	348.73	178.57	527.30
CFL_wood_2	EC	59.47	0.00	2.84	0.01	2.04	193.15	356.49	257.51	614.00
	Impact categories contribution to EC	23%	0%	1%	0%	1%	75%			
	EC with Price Variation	248.77	0.00	3.76	0.01	2.46	193.17	356.49	448.16	804.65
	EC with Discount Rate	0.72	0.00	2.55	0.01	1.91	193.15	356.49	198.33	554.82
	Price Variation&Discount Rate	91.16	0.00	2.99	0.01	2.11	193.15	356.49	289.43	645.92
CFL_wood_3	EC	25.50	0.00	3.05	0.01	1.56	286.43	433.00	316.54	749.54
	Impact categories contribution to EC	8%	0%	1%	0%	0%	90%			
	EC with Price Variation	172.22	0.00	3.25	0.01	1.66	286.45	433.00	463.60	896.60
	EC with Discount Rate	-20.04	0.00	2.98	0.01	1.53	286.43	433.00	270.91	703.91
	Price Variation&Discount Rate	50.06	0.00	3.08	0.01	1.58	286.43	433.00	341.17	774.17
	EC	84.38	0.00	4.76	0.01	3.20	386.12	508.35	478.48	986.83

CFL_wood_4	Impact categories contribution to EC	18%	0%	1%	0%	1%	81%			
	EC with Price Variation	350.12	0.00	5.50	0.02	3.55	386.15	508.35	745.33	1253.68
	EC with Discount Rate	1.91	0.00	4.53	0.01	3.10	386.11	508.35	395.66	904.01
	Price Variation&Discount Rate	128.88	0.00	4.88	0.01	3.26	386.12	508.35	523.16	1031.51
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
BP_h_1	EC	105.25	0.00	3.76	0.01	2.29	429.68	231.79	541.00	772.79
	Impact categories contribution to EC	19%	0%	1%	0%	0%	79%			
	EC with Price Variation	163.16	0.00	4.86	0.02	3.20	429.74	231.79	600.97	832.76
	EC with Discount Rate	85.46	0.00	3.39	0.01	1.97	429.67	231.79	520.50	752.29
	Price Variation&Discount Rate	115.40	0.00	3.96	0.01	2.45	429.69	231.79	551.51	783.30
BP_h_2	EC	193.91	0.00	6.85	0.03	4.35	579.41	369.18	784.55	1153.73
	Impact categories contribution to EC	25%	0%	1%	0%	1%	74%			
	EC with Price Variation	281.48	0.00	8.43	0.03	5.59	579.50	369.18	875.03	1244.21
	EC with Discount Rate	164.60	0.00	6.32	0.03	3.93	579.39	369.18	754.26	1123.44

	Price Variation&Discount Rate	209.10	0.00	7.12	0.03	4.57	579.43	369.18	800.25	1169.43
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
BP_uh_1	EC	52.93	0.00	2.20	0.01	1.31	286.48	139.73	342.93	482.66
	Impact categories contribution to EC	15%	0%	1%	0%	0%	84%			
	EC with Price Variation	59.02	0.00	2.69	0.01	1.57	286.51	139.73	349.80	489.53
	EC with Discount Rate	51.04	0.00	2.04	0.01	1.23	286.48	139.73	340.80	480.53
	Price Variation&Discount Rate	53.95	0.00	2.28	0.01	1.35	286.49	139.73	344.08	483.81
BP_uh_2	EC	135.61	0.00	5.76	0.02	3.15	386.41	297.72	530.94	828.66
	Impact categories contribution to EC	26%	0%	1%	0%	1%	73%			
	EC with Price Variation	160.56	0.00	6.65	0.03	3.63	386.46	297.72	557.33	855.05
	EC with Discount Rate	127.86	0.00	5.48	0.02	2.99	386.39	297.72	522.75	820.47
	Price Variation&Discount Rate	139.79	0.00	5.91	0.02	3.23	386.42	297.72	535.36	833.08
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2

W_alu_1	EC	101.71	0.00	11.27	0.04	5.97	38.46	1347.00	157.46	1504.46
	Impact categories contribution to EC	65%	0%	7%	0%	4%	24%			
	EC with Price Variation	157.61	0.00	17.39	0.08	9.36	59.97	1347.00	244.40	1591.40
	EC with Discount Rate	81.51	0.00	9.01	0.03	4.72	30.47	1347.00	125.75	1472.75
	Price Variation&Discount Rate	111.65	0.00	12.39	0.05	6.59	42.39	1347.00	173.07	1520.07
W_alu_2	EC	153.21	0.00	13.29	0.06	5.91	46.95	3841.45	219.42	4060.87
	Impact categories contribution to EC	70%	0%	6%	0%	3%	21%			
	EC with Price Variation	188.01	0.00	16.33	0.09	7.75	64.93	3841.45	277.11	4118.56
	EC with Discount Rate	140.84	0.00	12.17	0.05	5.24	40.27	3841.45	198.57	4040.02
	Price Variation&Discount Rate	159.43	0.00	13.84	0.07	6.24	50.24	3841.45	229.82	4071.27
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
W_plas_1	EC	109.08	0.00	10.85	0.05	5.99	41.24	573.38	167.20	740.58
	Impact categories contribution to EC	65%	0%	6%	0%	4%	25%			
	EC with Price Variation	185.55	0.00	17.58	0.08	9.70	66.16	573.38	279.06	852.44

	EC with Discount Rate	81.30	0.00	8.36	0.03	4.62	31.98	573.38	126.29	699.67
	Price Variation&Discount Rate	122.90	0.00	12.08	0.05	6.67	45.79	573.38	187.48	760.86
W_plas_2	EC	197.40	0.00	10.85	0.07	6.01	63.61	1088.92	277.94	1366.86
	Impact categories contribution to EC	71%	0%	4%	0%	2%	23%			
	EC with Price Variation	355.64	0.00	17.69	0.12	9.79	102.05	1088.92	485.29	1574.21
	EC with Discount Rate	140.99	0.00	8.32	0.05	4.61	49.33	1088.92	203.30	1292.22
	Price Variation&Discount Rate	225.73	0.00	12.10	0.08	6.70	70.63	1088.92	315.24	1404.16
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
W_wood_1	EC	91.02	0.00	10.41	0.04	6.22	36.44	674.91	144.13	819.04
	Impact categories contribution to EC	63%	0%	7%	0%	4%	25%			
	EC with Price Variation	157.56	0.00	16.87	0.07	10.06	58.46	674.91	243.02	917.93
	EC with Discount Rate	66.98	0.00	8.02	0.03	4.80	28.26	674.91	108.10	783.01
	Price Variation&Discount Rate	103.01	0.00	11.59	0.05	6.92	40.46	674.91	162.03	836.94
W_wood_2	EC	89.04	0.00	8.24	0.05	7.38	34.81	1384.06	139.52	1523.58

	Impact categories contribution to EC	64%	0%	6%	0%	5%	25%			
	EC with Price Variation	187.70	0.00	13.49	0.08	11.97	55.85	1384.06	269.09	1653.15
	EC with Discount Rate	55.12	0.00	6.30	0.03	5.69	27.00	1384.06	94.14	1478.20
	Price Variation&Discount Rate	106.39	0.00	9.19	0.05	8.22	38.66	1384.06	162.51	1546.57
W_wood_3	EC	94.23	0.00	11.97	0.07	6.42	38.78	640.55	151.47	792.02
	Impact categories contribution to EC	62%	0%	8%	0%	4%	26%			
	EC with Price Variation	166.92	0.00	19.26	0.13	10.34	58.19	640.55	254.84	895.39
	EC with Discount Rate	68.27	0.00	9.28	0.05	4.96	31.57	640.55	114.13	754.68
	Price Variation&Discount Rate	107.25	0.00	13.30	0.08	7.13	42.33	640.55	170.09	810.64
W_wood_4	EC	137.45	0.00	12.29	0.09	12.03	44.26	1352.05	206.13	1558.18
	Impact categories contribution to EC	67%	0%	6%	0%	6%	21%			
	EC with Price Variation	305.80	0.00	20.04	0.15	19.47	66.99	1352.05	412.45	1764.50
	EC with Discount Rate	80.22	0.00	9.44	0.06	9.28	35.82	1352.05	134.82	1486.87
	Price Variation&Discount Rate	166.89	0.00	13.70	0.10	13.38	48.42	1352.05	242.50	1594.55

Table 17 Building elements minimum scenario values

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
PRO_h_1	EC	1.50	0.00	0.00	0.00	0.35	0.05	470.93	1.90	€ 472.83
	Impact categories contribution to EC	79 %	0%	0%	0%	19%	3%			
	EC with Price Variation	10.18	0.00	0.00	0.00	0.38	0.07	470.93	10.64	481.57
	EC with Discount Rate	-1.20	0.00	0.00	0.00	0.34	0.05	470.93	-0.81	470.12
	Price Variation&Discount Rate	2.95	0.00	0.00	0.00	0.36	0.06	470.93	3.36	474.29
PRO_h_2	EC	5.00	0.00	0.00	0.00	0.73	0.02	459.70	5.75	465.45
	Impact categories contribution to EC	87 %	0%	0%	0%	13%	0%			
	EC with Price Variation	21.84	0.00	0.00	0.00	0.84	0.03	459.70	22.72	482.42
	EC with Discount Rate	-0.22	0.00	0.00	0.00	0.69	0.01	459.70	0.48	460.18
	Price Variation&Discount Rate	7.82	0.00	0.00	0.00	0.75	0.02	459.70	8.59	468.29
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
PRO_uh_1	EC	1.07	0.00	0.00	0.00	0.28	0.02	313.02	1.37	314.39

	Impact categories contribution to EC	78 %	0%	0%	0%	20%	1%			
	EC with Price Variation	7.32	0.00	0.00	0.00	0.29	0.03	313.02	7.64	320.66
	EC with Discount Rate	-0.87	0.00	0.00	0.00	0.28	0.01	313.02	-0.58	312.44
	Price Variation&Discount Rate	2.11	0.00	0.00	0.00	0.28	0.02	313.02	2.42	315.44
PRO_uh_2	EC	2.85	0.00	0.00	0.00	0.49	0.02	397.33	3.35	400.68
	Impact categories contribution to EC	85 %	0%	0%	0%	15%	0%			
	EC with Price Variation	11.27	0.00	0.00	0.00	0.53	0.03	397.33	11.82	409.15
	EC with Discount Rate	0.23	0.00	0.00	0.00	0.48	0.01	397.33	0.72	398.05
	Price Variation&Discount Rate	4.26	0.00	0.00	0.00	0.49	0.02	397.33	4.77	402.10
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FRO_mass_1	EC	7.09	0.00	0.00	0.00	1.53	0.00	224.34	8.62	232.96
	Impact categories contribution to EC	82 %	0%	0%	0%	18%	0%			
	EC with Price Variation	12.87	0.00	0.00	0.00	1.83	0.00	224.34	14.70	239.04
	EC with Discount Rate	5.29	0.00	0.00	0.00	1.44	0.00	224.34	6.73	231.07

	Price Variation&Discount Rate	8.06	0.00	0.00	0.00	1.58	0.00	224.34	9.64	233.98
FRO_mass_2	EC	8.60	0.00	0.00	0.00	0.87	0.00	493.10	9.47	502.57
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	12.69	0.00	0.00	0.00	1.08	0.00	493.10	13.77	506.87
	EC with Discount Rate	7.33	0.00	0.00	0.00	0.80	0.00	493.10	8.14	501.24
	Price Variation&Discount Rate	9.28	0.00	0.00	0.00	0.91	0.00	493.10	10.19	503.29
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FRO_wood_1	EC	2.82	0.00	0.00	0.00	0.41	0.05	254.34	3.28	257.62
	Impact categories contribution to EC	86 %	0%	0%	0%	13%	1%			
	EC with Price Variation	12.02	0.00	0.00	0.00	0.65	0.05	254.34	12.71	267.05
	EC with Discount Rate	-0.03	0.00	0.00	0.00	0.34	0.05	254.34	0.36	254.70
	Price Variation&Discount Rate	4.36	0.00	0.00	0.00	0.45	0.05	254.34	4.86	259.20
FRO_wood_2	EC	5.51	0.00	0.00	0.00	0.96	0.02	588.56	6.49	595.05
	Impact categories	85 %	0%	0%	0%	15%	0%			

	contribution to EC									
	EC with Price Variation	28.16	0.00	0.00	0.00	1.18	0.03	588.56	29.37	617.93
	EC with Discount Rate	-1.52	0.00	0.00	0.00	0.89	0.01	588.56	-0.62	587.94
	Price Variation&Discount Rate	9.30	0.00	0.00	0.00	1.00	0.02	588.56	10.32	598.88
FRO_wood_3	EC	5.17	0.00	0.00	0.00	1.52	0.00	€ 189.36	€ 6.68	196.04
	Impact categories contribution to EC	77%	0%	0%	0%	23%	0%			
	EC with Price Variation	19.54	0.00	0.00	0.00	1.78	0.00	189.36	21.32	210.68
	EC with Discount Rate	0.70	0.00	0.00	0.00	1.43	0.00	189.36	2.14	191.50
	Price Variation&Discount Rate	7.57	0.00	0.00	0.00	1.56	0.00	189.36	9.13	198.49
FRO_wood_4	EC	5.72	0.00	0.00	0.00	1.10	0.00	415.30	6.82	422.12
	Impact categories contribution to EC	84%	0%	0%	0%	16%	0%			
	EC with Price Variation	28.49	0.00	0.00	0.00	1.30	0.00	415.30	29.79	445.09
	EC with Discount Rate	-1.34	0.00	0.00	0.00	1.04	0.00	415.30	-0.30	415.00
	Price Variation&Discount Rate	9.54	0.00	0.00	0.00	1.13	0.00	415.30	10.67	425.97

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
EW_mas_1	EC	4.45	0.00	0.00	0.00	0.39	0.00	309.24	4.84	314.08
	Impact categories contribution to EC	92 %	0%	0%	0%	8%	0%			
	EC with Price Variation	5.77	0.00	0.00	0.00	0.59	0.00	309.24	6.37	315.61
	EC with Discount Rate	3.95	0.00	0.00	0.00	0.31	0.00	309.24	4.27	313.51
	Price Variation&Discount Rate	4.69	0.00	0.00	0.00	0.42	0.00	309.24	5.12	314.36
EW_mas_2	EC	3.98	0.00	0.00	0.00	0.40	0.03	406.05	4.41	410.46
	Impact categories contribution to EC	90 %	0%	0%	0%	9%	1%			
	EC with Price Variation	4.02	0.00	0.00	0.00	0.48	0.03	406.05	4.53	410.58
	EC with Discount Rate	3.97	0.00	0.00	0.00	0.37	0.03	406.05	4.38	410.43
	Price Variation&Discount Rate	3.99	0.00	0.00	0.00	0.41	0.03	406.05	4.43	410.48
EW_mas_3	EC	7.33	0.00	0.00	0.00	0.61	0.00	€ 264.03	€ 7.94	271.97
	Impact categories contribution to EC	92 %	0%	0%	0%	8%	0%			

	EC with Price Variation	10.84	0.00	0.00	0.00	0.96	0.00	264.03	11.80	275.83
	EC with Discount Rate	6.07	0.00	0.00	0.00	0.48	0.00	264.03	6.55	270.58
	Price Variation&Discount Rate	7.96	0.00	0.00	0.00	0.67	0.00	264.03	8.63	272.66
EW_mas_4	EC	6.07	0.00	0.00	0.00	0.63	0.04	402.90	6.75	409.65
	Impact categories contribution to EC	90 %	0%	0%	0%	9%	1%			
	EC with Price Variation	17.63	0.00	0.00	0.00	0.78	0.06	402.90	18.46	421.36
	EC with Discount Rate	2.49	0.00	0.00	0.00	0.58	0.04	402.90	3.11	406.01
	Price Variation&Discount Rate	8.01	0.00	0.00	0.00	0.65	0.05	402.90	8.71	411.61
EW_mas_5	EC	6.34	0.00	0.00	0.00	0.47	0.00	263.58	6.81	270.39
	Impact categories contribution to EC	93 %	0%	0%	0%	7%	0%			
	EC with Price Variation	9.60	0.00	0.00	0.00	0.82	0.00	263.58	10.42	274.00
	EC with Discount Rate	5.33	0.00	0.00	0.00	0.36	0.00	263.58	5.69	269.27
	Price Variation&Discount Rate	6.89	0.00	0.00	0.00	0.53	0.00	263.58	7.42	271.00
EW_mas_6	EC	6.69	0.00	0.00	0.00	0.43	0.03	329.43	7.16	336.59
	Impact categories	94 %	0%	0%	0%	6%	0%			

	contribution to EC									
	EC with Price Variation	7.42	0.00	0.00	0.00	0.53	0.03	329.43	7.98	337.41
	EC with Discount Rate	6.47	0.00	0.00	0.00	0.40	0.03	329.43	6.90	336.33
	Price Variation&Discount Rate	6.81	0.00	0.00	0.00	0.45	0.03	329.43	7.29	336.72
EW_mas_7	EC	5.07	0.00	0.00	0.00	0.54	0.00	€ 297.09	€ 5.61	302.70
	Impact categories contribution to EC	90 %	0%	0%	0%	10%	0%			
	EC with Price Variation	7.99	0.00	0.00	0.00	0.88	0.00	297.09	8.88	305.97
	EC with Discount Rate	4.17	0.00	0.00	0.00	0.43	0.00	297.09	4.60	301.69
	Price Variation&Discount Rate	5.56	0.00	0.00	0.00	0.60	0.00	297.09	6.16	303.25
EW_mas_8	EC	7.41	0.00	0.00	0.00	0.96	0.04	592.80	8.41	601.21
	Impact categories contribution to EC	88 %	0%	0%	0%	11%	1%			
	EC with Price Variation	18.37	0.00	0.00	0.00	1.09	0.06	592.80	19.51	612.31
	EC with Discount Rate	4.01	0.00	0.00	0.00	0.91	0.04	592.80	4.97	597.77
	Price Variation&Discount Rate	9.25	0.00	0.00	0.00	0.98	0.05	592.80	10.27	603.07

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
EW_wood_1	EC	1.23	0.00	0.00	0.00	0.53	0.05	228.84	1.81	230.65
	Impact categories contribution to EC	68%	0%	0%	0%	29%	3%			
	EC with Price Variation	10.75	0.00	0.00	0.00	0.76	0.06	228.84	11.57	240.41
	EC with Discount Rate	-1.74	0.00	0.00	0.00	0.44	0.05	228.84	-1.25	227.59
	Price Variation&Discount Rate	2.83	0.00	0.00	0.00	0.57	0.05	228.84	3.45	232.29
EW_wood_2	EC	3.43	0.00	0.00	0.00	0.59	0.08	430.48	4.10	434.58
	Impact categories contribution to EC	84%	0%	0%	0%	14%	2%			
	EC with Price Variation	17.39	0.00	0.00	0.00	0.71	0.09	430.48	18.19	448.67
	EC with Discount Rate	-0.90	0.00	0.00	0.00	0.55	0.07	430.48	-0.27	430.21
	Price Variation&Discount Rate	5.77	0.00	0.00	0.00	0.61	0.08	430.48	6.46	436.94
EW_wood_3	EC	3.86	0.00	0.00	0.00	0.61	0.00	287.89	4.47	292.36
	Impact categories contribution to EC	86%	0%	0%	0%	14%	0%			
	EC with Price Variation	13.20	0.00	0.00	0.00	0.84	0.00	287.89	14.04	301.93

	EC with Discount Rate	0.85	0.00	0.00	0.00	0.52	0.00	287.89	1.37	289.26
	Price Variation&Discount Rate	5.45	0.00	0.00	0.00	0.65	0.00	287.89	6.10	293.99
EW_wood_4	EC	3.79	0.00	0.00	0.00	1.07	0.04	620.13	4.90	625.03
	Impact categories contribution to EC	77 %	0%	0%	0%	22%	1%			
	EC with Price Variation	30.89	0.00	0.00	0.00	1.17	0.06	620.13	32.12	652.25
	EC with Discount Rate	-4.62	0.00	0.00	0.00	1.04	0.04	620.13	-3.55	616.58
	Price Variation&Discount Rate	8.33	0.00	0.00	0.00	1.08	0.05	620.13	9.46	629.59
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SW_mas_1	EC	2.05	0.00	0.00	0.00	0.15	0.00	129.25	2.20	131.45
	Impact categories contribution to EC	93 %	0%	0%	0%	7%	0%			
	EC with Price Variation	2.15	0.00	0.00	0.00	0.21	0.00	129.25	2.37	131.62
	EC with Discount Rate	2.02	0.00	0.00	0.00	0.13	0.00	129.25	2.14	131.39
	Price Variation&Discount Rate	2.07	0.00	0.00	0.00	0.16	0.00	129.25	2.23	131.48
SW_mas_2	EC	3.58	0.00	0.00	0.00	0.26	0.00	191.69	3.83	195.52

	Impact categories contribution to EC	93 %	0%	0%	0%	7%	0%			
	EC with Price Variation	3.81	0.00	0.00	0.00	0.38	0.00	191.69	4.19	195.88
	EC with Discount Rate	3.50	0.00	0.00	0.00	0.22	0.00	191.69	3.72	195.41
	Price Variation&Discount Rate	3.62	0.00	0.00	0.00	0.28	0.00	191.69	3.89	195.58
SW_mas_3	EC	1.94	0.00	0.00	0.00	0.11	0.00	90.92	2.05	92.97
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	2.35	0.00	0.00	0.00	0.14	0.00	90.92	2.48	93.40
	EC with Discount Rate	1.81	0.00	0.00	0.00	0.10	0.00	90.92	1.91	92.83
	Price Variation&Discount Rate	2.01	0.00	0.00	0.00	0.11	0.00	90.92	2.12	93.04
SW_mas_4	EC	4.37	0.00	0.00	0.00	0.26	0.00	144.96	4.62	149.58
	Impact categories contribution to EC	94 %	0%	0%	0%	6%	0%			
	EC with Price Variation	5.30	0.00	0.00	0.00	0.34	0.00	144.96	5.64	150.60
	EC with Discount Rate	4.08	0.00	0.00	0.00	0.23	0.00	144.96	4.31	149.27
	Price Variation&Discount Rate	4.52	0.00	0.00	0.00	0.27	0.00	144.96	4.79	149.75

SW_mas_5	EC	1.51	0.00	0.00	0.00	0.08	0.00	103.17	1.60	104.77
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	1.63	0.00	0.00	0.00	0.11	0.00	103.17	1.74	104.91
	EC with Discount Rate	1.47	0.00	0.00	0.00	0.08	0.00	103.17	1.55	104.72
	Price Variation&Discount Rate	1.53	0.00	0.00	0.00	0.09	0.00	103.17	1.62	104.79
SW_mas_6	EC	7.17	0.00	0.00	0.00	0.35	0.00	245.01	7.52	252.53
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	7.57	0.00	0.00	0.00	0.46	0.00	245.01	8.03	253.04
	EC with Discount Rate	7.04	0.00	0.00	0.00	0.32	0.00	245.01	7.36	252.37
	Price Variation&Discount Rate	7.23	0.00	0.00	0.00	0.37	0.00	245.01	7.61	252.62
SW_mas_7	EC	1.96	0.00	0.00	0.00	0.20	0.00	149.35	2.17	151.52
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	2.11	0.00	0.00	0.00	0.23	0.00	149.35	2.34	151.69
	EC with Discount Rate	1.92	0.00	0.00	0.00	0.19	0.00	149.35	2.11	151.46

	Price Variation&Discount Rate	1.99	0.00	0.00	0.00	0.21	0.00	149.35	2.20	151.55
SW_mas_8	EC	5.71	0.00	0.00	0.00	0.58	0.00	256.44	6.29	262.73
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	6.04	0.00	0.00	0.00	0.65	0.00	256.44	6.68	263.12
	EC with Discount Rate	5.61	0.00	0.00	0.00	0.56	0.00	256.44	6.17	262.61
	Price Variation&Discount Rate	5.76	0.00	0.00	0.00	0.59	0.00	256.44	6.36	262.80
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SW_wood_1	EC	0.62	0.00	0.00	0.00	0.09	0.00	98.38	0.71	99.09
	Impact categories contribution to EC	87 %	0%	0%	0%	13%	0%			
	EC with Price Variation	2.47	0.00	0.00	0.00	0.12	0.00	98.38	2.59	100.97
	EC with Discount Rate	0.04	0.00	0.00	0.00	0.08	0.00	98.38	0.12	98.50
	Price Variation&Discount Rate	0.93	0.00	0.00	0.00	0.09	0.00	98.38	1.02	99.40
SW_wood_2	EC	3.20	0.00	0.00	0.00	0.48	0.00	275.35	3.67	279.02
	Impact categories contribution to EC	87 %	0%	0%	0%	13%	0%			

	EC with Price Variation	15.75	0.00	0.00	0.00	0.57	0.00	275.35	16.32	291.67
	EC with Discount Rate	-0.70	0.00	0.00	0.00	0.45	0.00	275.35	-0.25	275.10
	Price Variation&Discount Rate	5.30	0.00	0.00	0.00	0.49	0.00	275.35	5.79	281.14
SW_wood_3	EC	0.69	0.00	0.00	0.00	0.24	0.00	117.14	0.93	118.07
	Impact categories contribution to EC	74 %	0%	0%	0%	26%	0%			
	EC with Price Variation	7.07	0.00	0.00	0.00	0.25	0.00	117.14	7.32	124.46
	EC with Discount Rate	-1.29	0.00	0.00	0.00	0.24	0.00	117.14	-1.05	116.09
	Price Variation&Discount Rate	1.76	0.00	0.00	0.00	0.24	0.00	117.14	2.00	119.14
SW_wood_4	EC	2.96	0.00	0.00	0.00	0.83	0.00	360.79	3.79	364.58
	Impact categories contribution to EC	78 %	0%	0%	0%	22%	0%			
	EC with Price Variation	24.73	0.00	0.00	0.00	0.89	0.00	360.79	25.62	386.41
	EC with Discount Rate	-3.80	0.00	0.00	0.00	0.81	0.00	360.79	-2.99	357.80
	Price Variation&Discount Rate	6.60	0.00	0.00	0.00	0.84	0.00	360.79	7.44	368.23
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2

IW_mas_1	EC	1.20	0.00	0.00	0.00	0.09	0.00	122.46	1.29	123.75
	Impact categories contribution to EC	93 %	0%	0%	0%	7%	0%			
	EC with Price Variation	1.12	0.00	0.00	0.00	0.11	0.00	122.46	1.23	123.69
	EC with Discount Rate	1.23	0.00	0.00	0.00	0.08	0.00	122.46	1.31	123.77
	Price Variation&Discount Rate	1.19	0.00	0.00	0.00	0.09	0.00	122.46	1.28	123.74
IW_mas_2	EC	2.53	0.00	0.00	0.00	0.18	0.00	174.01	2.72	176.73
	Impact categories contribution to EC	93 %	0%	0%	0%	7%	0%			
	EC with Price Variation	2.38	0.00	0.00	0.00	0.24	0.00	174.01	2.62	176.63
	EC with Discount Rate	2.58	0.00	0.00	0.00	0.17	0.00	174.01	2.75	176.76
	Price Variation&Discount Rate	2.51	0.00	0.00	0.00	0.19	0.00	174.01	2.70	176.71
IW_mas_3	EC	1.98	0.00	0.00	0.00	0.11	0.00	102.56	2.09	104.65
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	2.35	0.00	0.00	0.00	0.14	0.00	102.56	2.49	105.05
	EC with Discount Rate	1.87	0.00	0.00	0.00	0.10	0.00	102.56	1.97	104.53

	Price Variation&Discount Rate	2.05	0.00	0.00	0.00	0.11	0.00	102.56	2.16	104.72
IW_mas_4	EC	4.45	0.00	0.00	0.00	0.26	0.00	148.28	4.71	152.99
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	5.26	0.00	0.00	0.00	0.33	0.00	148.28	5.59	153.87
	EC with Discount Rate	4.20	0.00	0.00	0.00	0.23	0.00	148.28	4.44	152.72
	Price Variation&Discount Rate	4.59	0.00	0.00	0.00	0.27	0.00	148.28	4.86	153.14
IW_mas_5	EC	1.55	0.00	0.00	0.00	0.08	0.00	118.02	1.64	119.66
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	1.61	0.00	0.00	0.00	0.11	0.00	118.02	1.72	119.74
	EC with Discount Rate	1.53	0.00	0.00	0.00	0.08	0.00	118.02	1.61	119.63
	Price Variation&Discount Rate	1.56	0.00	0.00	0.00	0.09	0.00	118.02	1.65	119.67
IW_mas_6	EC	3.88	0.00	0.00	0.00	0.20	0.00	171.18	4.08	175.26
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	4.05	0.00	0.00	0.00	0.26	0.00	171.18	4.31	175.49

	EC with Discount Rate	3.83	0.00	0.00	0.00	0.18	0.00	171.18	4.01	175.19
	Price Variation&Discount Rate	3.91	0.00	0.00	0.00	0.21	0.00	171.18	4.12	175.30
IW_mas_7	EC	1.88	0.00	0.00	0.00	0.19	0.00	128.76	2.07	130.83
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	1.95	0.00	0.00	0.00	0.21	0.00	128.76	2.16	130.92
	EC with Discount Rate	1.86	0.00	0.00	0.00	0.19	0.00	128.76	2.04	130.80
	Price Variation&Discount Rate	1.89	0.00	0.00	0.00	0.19	0.00	128.76	2.09	130.85
IW_mas_8	EC	4.91	0.00	0.00	0.00	0.49	0.00	250.99	5.41	256.40
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	5.10	0.00	0.00	0.00	0.54	0.00	250.99	5.64	256.63
	EC with Discount Rate	4.85	0.00	0.00	0.00	0.48	0.00	250.99	5.33	256.32
	Price Variation&Discount Rate	4.94	0.00	0.00	0.00	0.50	0.00	250.99	5.45	256.44
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
	EC	0.39	0.00	0.00	0.00	0.07	0.00	77.28	0.46	77.74

IW_wood_1	Impact categories contribution to EC	86 %	0%	0%	0%	14%	0%			
	EC with Price Variation	2.11	0.00	0.00	0.00	0.08	0.00	77.28	2.20	79.48
	EC with Discount Rate	-0.14	0.00	0.00	0.00	0.06	0.00	77.28	-0.08	77.20
	Price Variation&Discount Rate	0.68	0.00	0.00	0.00	0.07	0.00	77.28	0.75	78.03
IW_wood_2	EC	4.06	0.00	0.00	0.00	0.59	0.00	224.77	4.65	229.42
	Impact categories contribution to EC	87 %	0%	0%	0%	13%	0%			
	EC with Price Variation	18.30	0.00	0.00	0.00	0.69	0.00	224.77	18.99	243.76
	EC with Discount Rate	-0.36	0.00	0.00	0.00	0.56	0.00	224.77	0.20	224.97
	Price Variation&Discount Rate	6.45	0.00	0.00	0.00	0.61	0.00	224.77	7.05	231.82
IW_wood_3	EC	0.70	0.00	0.00	0.00	0.27	0.00	110.08	0.96	111.04
	Impact categories contribution to EC	72 %	0%	0%	0%	28%	0%			
	EC with Price Variation	7.99	0.00	0.00	0.00	0.27	0.00	110.08	8.27	118.35
	EC with Discount Rate	-1.57	0.00	0.00	0.00	0.26	0.00	110.08	-1.30	108.78
	Price Variation&Discount Rate	1.92	0.00	0.00	0.00	0.27	0.00	110.08	2.19	112.27

IW_wood_4	EC	4.14	0.00	0.00	0.00	0.93	0.00	439.35	5.07	444.42
	Impact categories contribution to EC	82 %	0%	0%	0%	18%	0%			
	EC with Price Variation	27.96	0.00	0.00	0.00	1.02	0.00	439.35	28.98	468.33
	EC with Discount Rate	-3.25	0.00	0.00	0.00	0.90	0.00	439.35	-2.35	437.00
	Price Variation&Discount Rate	8.13	0.00	0.00	0.00	0.94	0.00	439.35	9.07	448.42
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CW_h_1	EC	5.42	0.00	0.00	0.00	0.78	0.00	373.16	6.20	379.36
	Impact categories contribution to EC	87 %	0%	0%	0%	13%	0%			
	EC with Price Variation	5.94	0.00	0.00	0.00	1.17	0.00	373.16	7.12	380.28
	EC with Discount Rate	5.21	0.00	0.00	0.00	0.64	0.00	373.16	5.85	379.01
	Price Variation&Discount Rate	5.52	0.00	0.00	0.00	0.85	0.00	373.16	6.37	379.53
CW_h_2	EC	7.19	0.00	0.00	0.00	0.91	0.00	374.12	8.11	382.23
	Impact categories contribution to EC	89 %	0%	0%	0%	11%	0%			
	EC with Price Variation	11.42	0.00	0.00	0.00	1.43	0.00	374.12	12.85	386.97

	EC with Discount Rate	5.71	0.00	0.00	0.00	0.73	0.00	374.12	6.44	380.56
	Price Variation&Discount Rate	7.94	0.00	0.00	0.00	1.01	0.00	374.12	8.95	383.07
CW_h_3	EC	11.50	0.00	0.00	0.00	1.20	0.00	291.76	12.69	304.45
	Impact categories contribution to EC	91%	0%	0%	0%	9%	0%			
	EC with Price Variation	20.26	0.00	0.00	0.00	1.87	0.00	291.76	22.13	313.89
	EC with Discount Rate	8.49	0.00	0.00	0.00	0.95	0.00	291.76	9.44	301.20
	Price Variation&Discount Rate	13.04	0.00	0.00	0.00	1.32	0.00	291.76	14.35	306.11
CW_h_4	EC	14.76	0.00	0.00	0.00	1.42	0.00	378.81	16.17	394.98
	Impact categories contribution to EC	91%	0%	0%	0%	9%	0%			
	EC with Price Variation	24.79	0.00	0.00	0.00	2.19	0.00	378.81	26.98	405.79
	EC with Discount Rate	11.33	0.00	0.00	0.00	1.14	0.00	378.81	12.47	391.28
	Price Variation&Discount Rate	16.52	0.00	0.00	0.00	1.56	0.00	378.81	18.07	396.88
CW_h_5	EC	7.72	0.00	0.00	0.00	0.80	0.00	325.23	8.52	333.75
	Impact categories contribution to EC	91%	0%	0%	0%	9%	0%			

	EC with Price Variation	10.15	0.00	0.00	0.00	1.25	0.00	325.23	11.40	336.63
	EC with Discount Rate	6.93	0.00	0.00	0.00	0.64	0.00	325.23	7.57	332.80
	Price Variation&Discount Rate	8.14	0.00	0.00	0.00	0.87	0.00	325.23	9.02	334.25
CW_h_6	EC	8.93	0.00	0.00	0.00	0.94	0.00	335.76	9.88	345.64
	Impact categories contribution to EC	90%	0%	0%	0%	10%	0%			
	EC with Price Variation	13.59	0.00	0.00	0.00	1.46	0.00	335.76	15.05	350.81
	EC with Discount Rate	7.33	0.00	0.00	0.00	0.75	0.00	335.76	8.08	343.84
	Price Variation&Discount Rate	9.75	0.00	0.00	0.00	1.04	0.00	335.76	10.79	346.55
CW_h_7	EC	8.17	0.00	0.00	0.00	1.14	0.00	276.84	9.31	286.15
	Impact categories contribution to EC	88%	0%	0%	0%	12%	0%			
	EC with Price Variation	14.36	0.00	0.00	0.00	1.71	0.00	276.84	16.07	292.91
	EC with Discount Rate	6.04	0.00	0.00	0.00	0.93	0.00	276.84	6.98	283.82
	Price Variation&Discount Rate	9.26	0.00	0.00	0.00	1.24	0.00	276.84	10.50	287.34
CW_h_8	EC	12.85	0.00	0.00	0.00	1.60	0.00	382.18	14.45	396.63
	Impact categories	89%	0%	0%	0%	11%	0%			

	contribution to EC									
	EC with Price Variation	19.96	0.00	0.00	0.00	2.24	0.00	382.18	22.20	404.38
	EC with Discount Rate	10.41	0.00	0.00	0.00	1.37	0.00	382.18	11.78	393.96
	Price Variation&Discount Rate	14.10	0.00	0.00	0.00	1.72	0.00	382.18	15.82	398.00
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CW_uh_1	EC	4.28	0.00	0.00	0.00	0.67	0.00	252.90	4.95	257.85
	Impact categories contribution to EC	86 %	0%	0%	0%	14%	0%			
	EC with Price Variation	6.08	0.00	0.00	0.00	1.05	0.00	252.90	7.14	260.04
	EC with Discount Rate	3.64	0.00	0.00	0.00	0.54	0.00	252.90	4.17	257.07
	Price Variation&Discount Rate	4.60	0.00	0.00	0.00	0.74	0.00	252.90	5.34	258.24
CW_uh_2	EC	6.46	0.00	0.00	0.00	0.82	0.00	407.86	7.29	415.15
	Impact categories contribution to EC	89 %	0%	0%	0%	11%	0%			
	EC with Price Variation	8.30	0.00	0.00	0.00	1.30	0.00	407.86	9.60	417.46
	EC with Discount Rate	5.85	0.00	0.00	0.00	0.66	0.00	407.86	6.52	414.38

	Price Variation&Discount Rate	6.78	0.00	0.00	0.00	0.91	0.00	407.86	7.69	415.55
CW_uh_3	EC	5.89	0.00	0.00	0.00	0.71	0.00	194.94	6.61	201.55
	Impact categories contribution to EC	89%	0%	0%	0%	11%	0%			
	EC with Price Variation	8.89	0.00	0.00	0.00	1.15	0.00	194.94	10.04	204.98
	EC with Discount Rate	4.92	0.00	0.00	0.00	0.57	0.00	194.94	5.49	200.43
	Price Variation&Discount Rate	6.41	0.00	0.00	0.00	0.79	0.00	194.94	7.20	202.14
CW_uh_4	EC	8.39	0.00	0.00	0.00	0.87	0.00	261.49	9.26	270.75
	Impact categories contribution to EC	91%	0%	0%	0%	9%	0%			
	EC with Price Variation	11.83	0.00	0.00	0.00	1.36	0.00	261.49	13.19	274.68
	EC with Discount Rate	7.28	0.00	0.00	0.00	0.71	0.00	261.49	7.99	269.48
	Price Variation&Discount Rate	8.98	0.00	0.00	0.00	0.95	0.00	261.49	9.94	271.43
CW_uh_5	EC	5.69	0.00	0.00	0.00	0.70	0.00	267.26	6.39	273.65
	Impact categories contribution to EC	89%	0%	0%	0%	11%	0%			
	EC with Price Variation	8.06	0.00	0.00	0.00	1.14	0.00	267.26	9.20	276.46

	EC with Discount Rate	4.91	0.00	0.00	0.00	0.55	0.00	267.26	5.46	272.72
	Price Variation&Discount Rate	6.10	0.00	0.00	0.00	0.78	0.00	267.26	6.88	274.14
CW_uh_6	EC	9.17	0.00	0.00	0.00	0.86	0.00	334.46	10.03	344.49
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	11.70	0.00	0.00	0.00	1.35	0.00	334.46	13.05	347.51
	EC with Discount Rate	8.34	0.00	0.00	0.00	0.70	0.00	334.46	9.04	343.50
	Price Variation&Discount Rate	9.61	0.00	0.00	0.00	0.94	0.00	334.46	10.55	345.01
CW_uh_7	EC	2.57	0.00	0.00	0.00	0.66	0.00	180.02	3.23	183.25
	Impact categories contribution to EC	80 %	0%	0%	0%	20%	0%			
	EC with Price Variation	2.74	0.00	0.00	0.00	0.97	0.00	180.02	3.72	183.74
	EC with Discount Rate	2.52	0.00	0.00	0.00	0.55	0.00	180.02	3.07	183.09
	Price Variation&Discount Rate	2.60	0.00	0.00	0.00	0.71	0.00	180.02	3.32	183.34
CW_uh_8	EC	6.49	0.00	0.00	0.00	1.05	0.00	277.10	7.54	284.64
	Impact categories contribution to EC	86 %	0%	0%	0%	14%	0%			

	EC with Price Variation	6.76	0.00	0.00	0.00	1.35	0.00	277.10	8.11	285.21
	EC with Discount Rate	6.40	0.00	0.00	0.00	0.95	0.00	277.10	7.35	284.45
	Price Variation&Discount Rate	6.53	0.00	0.00	0.00	1.11	0.00	277.10	7.64	284.74
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SCW_h_1	EC	2.81	0.00	0.00	0.00	0.24	0.00	139.87	3.06	142.93
	Impact categories contribution to EC	92 %	0%	0%	0%	8%	0%			
	EC with Price Variation	3.40	0.00	0.00	0.00	0.37	0.00	139.87	3.77	143.64
	EC with Discount Rate	2.60	0.00	0.00	0.00	0.20	0.00	139.87	2.80	142.67
	Price Variation&Discount Rate	2.92	0.00	0.00	0.00	0.27	0.00	139.87	3.19	143.06
SCW_h_2	EC	6.21	0.00	0.00	0.00	0.48	0.00	217.38	6.68	224.06
	Impact categories contribution to EC	93 %	0%	0%	0%	7%	0%			
	EC with Price Variation	9.30	0.00	0.00	0.00	0.73	0.00	217.38	10.03	227.41
	EC with Discount Rate	5.14	0.00	0.00	0.00	0.39	0.00	217.38	5.53	222.91
	Price Variation&Discount Rate	6.75	0.00	0.00	0.00	0.52	0.00	217.38	7.27	224.65

SCW_h_3	EC	2.62	0.00	0.00	0.00	0.20	0.00	69.32	2.82	72.14
	Impact categories contribution to EC	93 %	0%	0%	0%	7%	0%			
	EC with Price Variation	3.52	0.00	0.00	0.00	0.29	0.00	69.32	3.81	73.13
	EC with Discount Rate	2.31	0.00	0.00	0.00	0.17	0.00	69.32	2.48	71.80
	Price Variation&Discount Rate	2.78	0.00	0.00	0.00	0.22	0.00	69.32	3.00	72.32
SCW_h_4	EC	7.25	0.00	0.00	0.00	0.50	0.00	170.67	7.75	178.42
	Impact categories contribution to EC	94 %	0%	0%	0%	6%	0%			
	EC with Price Variation	11.32	0.00	0.00	0.00	0.72	0.00	170.67	12.04	182.71
	EC with Discount Rate	5.88	0.00	0.00	0.00	0.42	0.00	170.67	6.30	176.97
	Price Variation&Discount Rate	7.96	0.00	0.00	0.00	0.54	0.00	170.67	8.50	179.17
SCW_h_5	EC	2.32	0.00	0.00	0.00	0.13	0.00	143.28	2.45	145.73
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	2.51	0.00	0.00	0.00	0.17	0.00	143.28	2.69	145.97
	EC with Discount Rate	2.25	0.00	0.00	0.00	0.12	0.00	143.28	2.37	145.65

	Price Variation&Discount Rate	2.35	0.00	0.00	0.00	0.14	0.00	143.28	2.49	145.77
SCW_h_6	EC	7.00	0.00	0.00	0.00	0.33	0.00	212.08	7.33	219.41
	Impact categories contribution to EC	95%	0%	0%	0%	5%	0%			
	EC with Price Variation	7.25	0.00	0.00	0.00	0.42	0.00	212.08	7.67	219.75
	EC with Discount Rate	6.92	0.00	0.00	0.00	0.31	0.00	212.08	7.22	219.30
	Price Variation&Discount Rate	7.04	0.00	0.00	0.00	0.35	0.00	212.08	7.39	219.47
SCW_h_7	EC	2.81	0.00	0.00	0.00	0.31	0.00	161.93	3.12	165.05
	Impact categories contribution to EC	90%	0%	0%	0%	10%	0%			
	EC with Price Variation	3.47	0.00	0.00	0.00	0.41	0.00	161.93	3.88	165.81
	EC with Discount Rate	2.57	0.00	0.00	0.00	0.28	0.00	161.93	2.85	164.78
	Price Variation&Discount Rate	2.93	0.00	0.00	0.00	0.33	0.00	161.93	3.26	165.19
SCW_h_8	EC	8.59	0.00	0.00	0.00	0.82	0.00	282.15	9.42	291.57
	Impact categories contribution to EC	91%	0%	0%	0%	9%	0%			
	EC with Price Variation	12.06	0.00	0.00	0.00	1.03	0.00	282.15	13.09	295.24

	EC with Discount Rate	7.41	0.00	0.00	0.00	0.75	0.00	282.15	8.15	290.30
	Price Variation&Discount Rate	9.20	0.00	0.00	0.00	0.86	0.00	282.15	10.06	292.21
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SCW_uh_1	EC	1.97	0.00	0.00	0.00	0.14	0.00	108.66	2.10	110.76
	Impact categories contribution to EC	94 %	0%	0%	0%	6%	0%			
	EC with Price Variation	2.01	0.00	0.00	0.00	0.19	0.00	108.66	2.21	110.87
	EC with Discount Rate	1.95	0.00	0.00	0.00	0.12	0.00	108.66	2.07	110.73
	Price Variation&Discount Rate	1.97	0.00	0.00	0.00	0.15	0.00	108.66	2.12	110.78
SCW_uh_2	EC	3.41	0.00	0.00	0.00	0.24	0.00	158.76	3.64	162.40
	Impact categories contribution to EC	94 %	0%	0%	0%	6%	0%			
	EC with Price Variation	3.49	0.00	0.00	0.00	0.34	0.00	158.76	3.83	162.59
	EC with Discount Rate	3.38	0.00	0.00	0.00	0.20	0.00	158.76	3.58	162.34
	Price Variation&Discount Rate	3.42	0.00	0.00	0.00	0.25	0.00	158.76	3.67	162.43
	EC	1.73	0.00	0.00	0.00	0.09	0.00	38.10	1.82	39.92

SCW_uh_3	Impact categories contribution to EC	95%	0%	0%	0%	5%	0%			
	EC with Price Variation	2.07	0.00	0.00	0.00	0.10	0.00	38.10	2.17	40.27
	EC with Discount Rate	1.63	0.00	0.00	0.00	0.08	0.00	38.10	1.71	39.81
	Price Variation&Discount Rate	1.79	0.00	0.00	0.00	0.09	0.00	38.10	1.88	39.98
SCW_uh_4	EC	4.20	0.00	0.00	0.00	0.23	0.00	112.03	4.43	116.46
	Impact categories contribution to EC	95%	0%	0%	0%	5%	0%			
	EC with Price Variation	4.98	0.00	0.00	0.00	0.29	0.00	112.03	5.28	117.31
	EC with Discount Rate	3.96	0.00	0.00	0.00	0.21	0.00	112.03	4.17	116.20
	Price Variation&Discount Rate	4.33	0.00	0.00	0.00	0.24	0.00	112.03	4.57	116.60
SCW_uh_5	EC	2.10	0.00	0.00	0.00	0.11	0.00	103.35	2.21	105.56
	Impact categories contribution to EC	95%	0%	0%	0%	5%	0%			
	EC with Price Variation	2.17	0.00	0.00	0.00	0.13	0.00	103.35	2.30	105.65
	EC with Discount Rate	2.08	0.00	0.00	0.00	0.10	0.00	103.35	2.18	105.53
	Price Variation&Discount Rate	2.11	0.00	0.00	0.00	0.11	0.00	103.35	2.22	105.57

SCW_uh_6	EC	7.00	0.00	0.00	0.00	0.33	0.00	212.08	7.33	219.41
	Impact categories contribution to EC	95 %	0%	0%	0%	5%	0%			
	EC with Price Variation	7.25	0.00	0.00	0.00	0.42	0.00	212.08	7.67	219.75
	EC with Discount Rate	6.92	0.00	0.00	0.00	0.31	0.00	212.08	7.22	219.30
	Price Variation&Discount Rate	7.04	0.00	0.00	0.00	0.35	0.00	212.08	7.39	219.47
SCW_uh_7	EC	1.88	0.00	0.00	0.00	0.19	0.00	128.76	2.07	130.83
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	1.95	0.00	0.00	0.00	0.21	0.00	128.76	2.16	130.92
	EC with Discount Rate	1.86	0.00	0.00	0.00	0.19	0.00	128.76	2.04	130.80
	Price Variation&Discount Rate	1.89	0.00	0.00	0.00	0.19	0.00	128.76	2.09	130.85
SCW_uh_8	EC	5.54	0.00	0.00	0.00	0.56	0.00	223.51	6.10	229.61
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	5.72	0.00	0.00	0.00	0.61	0.00	223.51	6.33	229.84
	EC with Discount Rate	5.48	0.00	0.00	0.00	0.55	0.00	223.51	6.03	229.54

	Price Variation&Discount Rate	5.57	0.00	0.00	0.00	0.57	0.00	223.51	6.14	229.65
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FL_mas_1	EC	2.43	0.00	0.00	0.00	0.29	0.00	149.08	2.73	151.81
	Impact categories contribution to EC	89 %	0%	0%	0%	11%	0%			
	EC with Price Variation	2.80	0.00	0.00	0.00	0.32	0.00	149.08	3.13	152.21
	EC with Discount Rate	2.32	0.00	0.00	0.00	0.28	0.00	149.08	2.60	151.68
	Price Variation&Discount Rate	2.49	0.00	0.00	0.00	0.30	0.00	149.08	2.79	151.87
FL_mas_2	EC	6.37	0.00	0.00	0.00	0.61	0.05	258.22	7.03	265.25
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	1%			
	EC with Price Variation	8.30	0.00	0.00	0.00	0.72	0.05	258.22	9.07	267.29
	EC with Discount Rate	5.78	0.00	0.00	0.00	0.57	0.05	258.22	6.39	264.61
	Price Variation&Discount Rate	6.70	0.00	0.00	0.00	0.63	0.05	258.22	7.37	265.59
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2

FL_wood_1	EC	0.78	0.00	0.00	0.00	0.25	0.07	241.13	1.10	242.23
	Impact categories contribution to EC	71 %	0%	0%	0%	23%	6%			
	EC with Price Variation	6.08	0.00	0.00	0.00	0.27	0.07	241.13	6.41	247.54
	EC with Discount Rate	-0.86	0.00	0.00	0.00	0.24	0.07	241.13	-0.55	240.58
	Price Variation&Discount Rate	1.67	0.00	0.00	0.00	0.25	0.07	241.13	1.99	243.12
FL_wood_2	EC	5.00	0.00	0.00	0.00	0.72	0.05	339.61	5.76	345.37
	Impact categories contribution to EC	87 %	0%	0%	0%	12%	1%			
	EC with Price Variation	20.72	0.00	0.00	0.00	0.86	0.05	339.61	21.63	361.24
	EC with Discount Rate	0.12	0.00	0.00	0.00	0.67	0.05	339.61	0.84	340.45
	Price Variation&Discount Rate	7.63	0.00	0.00	0.00	0.74	0.05	339.61	8.42	348.03
FL_wood_3	EC	1.61	0.00	0.00	0.00	0.51	0.07	312.88	2.20	315.08
	Impact categories contribution to EC	73 %	0%	0%	0%	23%	3%			
	EC with Price Variation	13.34	0.00	0.00	0.00	0.54	0.07	312.88	13.95	326.83
	EC with Discount Rate	-2.03	0.00	0.00	0.00	0.51	0.07	312.88	-1.45	311.43

	Price Variation&Discount Rate	3.58	0.00	0.00	0.00	0.52	0.07	312.88	4.16	317.04
FL_wood_4	EC	7.45	0.00	0.00	0.00	1.17	0.09	381.55	8.71	390.26
	Impact categories contribution to EC	85 %	0%	0%	0%	13%	1%			
	EC with Price Variation	30.89	0.00	0.00	0.00	1.30	0.09	381.55	32.29	413.84
	EC with Discount Rate	0.17	0.00	0.00	0.00	1.13	0.09	381.55	1.39	382.94
	Price Variation&Discount Rate	11.37	0.00	0.00	0.00	1.19	0.09	381.55	12.66	394.21
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
TFL mas_1	EC	4.01	0.00	0.00	0.00	0.45	0.00	159.38	4.46	163.84
	Impact categories contribution to EC	90 %	0%	0%	0%	10%	0%			
	EC with Price Variation	4.19	0.00	0.00	0.00	0.49	0.00	159.38	4.67	164.05
	EC with Discount Rate	3.96	0.00	0.00	0.00	0.44	0.00	159.38	4.39	163.77
	Price Variation&Discount Rate	4.04	0.00	0.00	0.00	0.45	0.00	159.38	4.50	163.88
TFL mas_2	EC	6.92	0.00	0.00	0.00	0.70	0.00	298.10	7.62	305.72
	Impact categories	91 %	0%	0%	0%	9%	0%			

	contribution to EC									
	EC with Price Variation	14.74	0.00	0.00	0.00	0.83	0.00	298.10	15.57	313.67
	EC with Discount Rate	4.49	0.00	0.00	0.00	0.66	0.00	298.10	5.16	303.26
	Price Variation&Discount Rate	8.23	0.00	0.00	0.00	0.72	0.00	298.10	8.95	307.05
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
TFL_wood_1	EC	1.33	0.00	0.00	0.00	0.28	0.00	276.24	1.61	277.85
	Impact categories contribution to EC	82 %	0%	0%	0%	18%	0%			
	EC with Price Variation	8.57	0.00	0.00	0.00	0.32	0.00	276.24	8.88	285.12
	EC with Discount Rate	-0.92	0.00	0.00	0.00	0.27	0.00	276.24	-0.65	275.59
	Price Variation&Discount Rate	2.54	0.00	0.00	0.00	0.29	0.00	276.24	2.83	279.07
TFL_wood_2	EC	4.41	0.00	0.00	0.00	0.69	0.00	352.06	5.10	357.16
	Impact categories contribution to EC	86 %	0%	0%	0%	13%	0%			
	EC with Price Variation	21.80	0.00	0.00	0.00	0.80	0.00	352.06	22.60	374.66
	EC with Discount Rate	-0.99	0.00	0.00	0.00	0.65	0.00	352.06	-0.33	351.73

	Price Variation&Discount Rate	7.32	0.00	0.00	0.00	0.71	0.00	352.06	8.03	360.09
TFL_wood_3	EC	2.81	0.00	0.00	0.00	0.62	0.03	262.62	3.47	266.09
	Impact categories contribution to EC	81 %	0%	0%	0%	18%	1%			
	EC with Price Variation	14.28	0.00	0.00	0.00	0.65	0.03	262.62	14.96	277.58
	EC with Discount Rate	-0.75	0.00	0.00	0.00	0.62	0.03	262.62	-0.10	262.52
	Price Variation&Discount Rate	4.73	0.00	0.00	0.00	0.63	0.03	262.62	5.39	268.01
TFL_wood_4	EC	4.34	0.00	0.00	0.00	0.96	0.05	490.22	5.34	495.56
	Impact categories contribution to EC	81 %	0%	0%	0%	18%	1%			
	EC with Price Variation	30.02	0.00	0.00	0.00	1.05	0.05	490.22	31.12	521.34
	EC with Discount Rate	-3.63	0.00	0.00	0.00	0.93	0.05	490.22	-2.66	487.56
	Price Variation&Discount Rate	8.64	0.00	0.00	0.00	0.97	0.05	490.22	9.66	499.88
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CFL mas_1	EC	3.96	0.00	0.00	0.00	0.39	0.00	153.33	4.35	157.68
	Impact categories	91 %	0%	0%	0%	9%	0%			

	contribution to EC									
	EC with Price Variation	4.97	0.00	0.00	0.00	0.50	0.00	153.33	5.48	158.81
	EC with Discount Rate	3.60	0.00	0.00	0.00	0.35	0.00	153.33	3.95	157.28
	Price Variation&Discount Rate	4.14	0.00	0.00	0.00	0.41	0.00	153.33	4.55	157.88
CFL mas _2	EC	8.93	0.00	0.00	0.00	0.86	0.05	442.73	9.84	452.57
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	0%			
	EC with Price Variation	17.53	0.00	0.00	0.00	1.11	0.05	442.73	18.68	461.41
	EC with Discount Rate	6.22	0.00	0.00	0.00	0.78	0.05	442.73	7.04	449.77
	Price Variation&Discount Rate	10.38	0.00	0.00	0.00	0.90	0.05	442.73	11.33	454.06
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CFL_wood _1	EC	1.66	0.00	0.00	0.00	0.32	0.03	348.73	2.02	350.75
	Impact categories contribution to EC	82 %	0%	0%	0%	16%	2%			
	EC with Price Variation	9.07	0.00	0.00	0.00	0.36	0.03	348.73	9.46	358.19
	EC with Discount Rate	-0.63	0.00	0.00	0.00	0.31	0.03	348.73	-0.29	348.44

	Price Variation&Discount Rate	2.90	0.00	0.00	0.00	0.33	0.03	348.73	3.27	352.00
CFL_wood_2	EC	5.25	0.00	0.00	0.00	0.75	0.05	356.49	6.04	362.53
	Impact categories contribution to EC	87%	0%	0%	0%	12%	1%			
	EC with Price Variation	21.95	0.00	0.00	0.00	0.90	0.05	356.49	22.90	379.39
	EC with Discount Rate	0.06	0.00	0.00	0.00	0.70	0.05	356.49	0.81	357.30
	Price Variation&Discount Rate	8.04	0.00	0.00	0.00	0.77	0.05	356.49	8.86	365.35
CFL_wood_3	EC	2.25	0.00	0.00	0.00	0.57	0.07	433.00	2.89	435.89
	Impact categories contribution to EC	78%	0%	0%	0%	20%	2%			
	EC with Price Variation	15.20	0.00	0.00	0.00	0.61	0.07	433.00	15.87	448.87
	EC with Discount Rate	-1.77	0.00	0.00	0.00	0.56	0.07	433.00	-1.14	431.86
	Price Variation&Discount Rate	4.42	0.00	0.00	0.00	0.58	0.07	433.00	5.06	438.06
CFL_wood_4	EC	7.45	0.00	0.00	0.00	1.17	0.09	508.35	8.71	517.06
	Impact categories contribution to EC	85%	0%	0%	0%	13%	1%			
	EC with Price Variation	30.89	0.00	0.00	0.00	1.30	0.09	508.35	32.29	540.64

	EC with Discount Rate	0.17	0.00	0.00	0.00	1.13	0.09	508.35	1.39	509.74
	Price Variation&Discount Rate	11.37	0.00	0.00	0.00	1.19	0.09	508.35	12.66	521.01
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
BP_h_1	EC	9.29	0.00	0.00	0.00	0.84	0.10	231.79	10.23	242.02
	Impact categories contribution to EC	91 %	0%	0%	0%	8%	1%			
	EC with Price Variation	14.40	0.00	0.00	0.00	1.17	0.10	231.79	15.67	247.46
	EC with Discount Rate	7.54	0.00	0.00	0.00	0.72	0.10	231.79	8.37	240.16
	Price Variation&Discount Rate	10.18	0.00	0.00	0.00	0.90	0.10	231.79	11.18	242.97
BP_h_2	EC	17.11	0.00	0.00	0.00	1.59	0.14	369.18	18.84	388.02
	Impact categories contribution to EC	91 %	0%	0%	0%	8%	1%			
	EC with Price Variation	24.84	0.00	0.00	0.00	2.05	0.14	369.18	27.02	396.20
	EC with Discount Rate	14.52	0.00	0.00	0.00	1.44	0.14	369.18	16.10	385.28
	Price Variation&Discount Rate	18.45	0.00	0.00	0.00	1.67	0.14	369.18	20.26	389.44
Bauteil-name	**Calculation case**	**GWP**	**ODP**	**AP** €/SO2	**EP** €/PO4	**POCP**	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2

		€/kg CO_2	€/R11			€/Ethen				
BP_uh_1	EC	4.67	0.00	0.00	0.00	0.48	0.07	139.73	5.22	144.95
	Impact categories contribution to EC	90 %	0%	0%	0%	9%	1%			
	EC with Price Variation	5.21	0.00	0.00	0.00	0.57	0.07	139.73	5.85	145.58
	EC with Discount Rate	4.50	0.00	0.00	0.00	0.45	0.07	139.73	5.02	144.75
	Price Variation&Discount Rate	4.76	0.00	0.00	0.00	0.50	0.07	139.73	5.32	145.05
BP_uh_2	EC	11.97	0.00	0.00	0.00	1.15	0.09	297.72	13.21	310.93
	Impact categories contribution to EC	91 %	0%	0%	0%	9%	1%			
	EC with Price Variation	14.17	0.00	0.00	0.00	1.33	0.09	297.72	15.59	313.31
	EC with Discount Rate	11.28	0.00	0.00	0.00	1.10	0.09	297.72	12.47	310.19
	Price Variation&Discount Rate	12.33	0.00	0.00	0.00	1.18	0.09	297.72	13.61	311.33
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
W_alu_1	EC	8.97	0.00	0.00	0.00	2.19	0.01	1347.00	11.17	1358.17
	Impact categories contribution to EC	80 %	0%	0%	0%	20%	0%			

	EC with Price Variation	13.91	0.00	0.00	0.00	3.42	0.01	1347.00	17.35	1364.35
	EC with Discount Rate	7.19	0.00	0.00	0.00	1.73	0.01	1347.00	8.93	1355.93
	Price Variation&Discount Rate	9.85	0.00	0.00	0.00	2.41	0.01	1347.00	12.28	1359.28
W_alu_2	EC	13.52	0.00	0.00	0.00	2.16	0.01	3841.45	15.70	3857.15
	Impact categories contribution to EC	86 %	0%	0%	0%	14%	0%			
	EC with Price Variation	16.59	0.00	0.00	0.00	2.84	0.02	3841.45	19.45	3860.90
	EC with Discount Rate	12.43	0.00	0.00	0.00	1.92	0.01	3841.45	14.36	3855.81
	Price Variation&Discount Rate	14.07	0.00	0.00	0.00	2.28	0.01	3841.45	16.37	3857.82
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
W_plas_1	EC	9.62	0.00	0.00	0.00	2.19	0.01	573.38	11.83	585.21
	Impact categories contribution to EC	81 %	0%	0%	0%	19%	0%			
	EC with Price Variation	16.37	0.00	0.00	0.00	3.55	0.02	573.38	19.94	593.32
	EC with Discount Rate	7.17	0.00	0.00	0.00	1.69	0.01	573.38	8.87	582.25
	Price Variation&Discount Rate	10.84	0.00	0.00	0.00	2.44	0.01	573.38	13.30	586.68

W_plas_2	EC	17.42	0.00	0.00	0.00	2.20	0.02	1088.92	19.64	1108.56
	Impact categories contribution to EC	89 %	0%	0%	0%	11%	0%			
	EC with Price Variation	31.38	0.00	0.00	0.00	3.58	0.02	1088.92	34.99	1123.91
	EC with Discount Rate	12.44	0.00	0.00	0.00	1.69	0.01	1088.92	14.14	1103.06
	Price Variation&Discount Rate	19.92	0.00	0.00	0.00	2.45	0.02	1088.92	22.39	1111.31
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
W_wood_1	EC	8.03	0.00	0.00	0.00	2.28	0.01	674.91	10.32	685.23
	Impact categories contribution to EC	78 %	0%	0%	0%	22%	0%			
	EC with Price Variation	13.90	0.00	0.00	0.00	3.68	0.01	674.91	17.60	692.51
	EC with Discount Rate	5.91	0.00	0.00	0.00	1.76	0.01	674.91	7.68	682.59
	Price Variation&Discount Rate	9.09	0.00	0.00	0.00	2.53	0.01	674.91	11.63	686.54
W_wood_2	EC	7.86	0.00	0.00	0.00	2.70	0.01	1384.06	10.57	1394.63
	Impact categories contribution to EC	74 %	0%	0%	0%	26%	0%			
	EC with Price Variation	16.56	0.00	0.00	0.00	4.38	0.01	1384.06	20.96	1405.02

	EC with Discount Rate	4.86	0.00	0.00	0.00	2.08	0.01	1384.06	6.95	1391.01
	Price Variation&Discount Rate	9.39	0.00	0.00	0.00	3.01	0.01	1384.06	12.41	1396.47
W_wood_3	EC	8.31	0.00	0.00	0.00	2.35	0.01	640.55	10.67	651.22
	Impact categories contribution to EC	78%	0%	0%	0%	22%	0%			
	EC with Price Variation	14.73	0.00	0.00	0.00	3.79	0.01	640.55	18.53	659.08
	EC with Discount Rate	6.02	0.00	0.00	0.00	1.82	0.01	640.55	7.85	648.40
	Price Variation&Discount Rate	9.46	0.00	0.00	0.00	2.61	0.01	640.55	12.09	652.64
W_wood_4	EC	12.13	0.00	0.00	0.00	4.40	0.01	1352.05	16.54	1368.59
	Impact categories contribution to EC	73%	0%	0%	0%	27%	0%			
	EC with Price Variation	26.98	0.00	0.01	0.00	7.12	0.02	1352.05	34.13	1386.18
	EC with Discount Rate	7.08	0.00	0.00	0.00	3.40	0.01	1352.05	10.48	1362.53
	Price Variation&Discount Rate	14.73	0.00	0.00	0.00	4.90	0.01	1352.05	19.64	1371.69

Table 18 Building elements mean scenario values

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
PRO_h_1	EC	9.97	0.00	0.95	0.00	0.66	123.76	470.93	135.35	€ 606.28
	Impact categories contribution to EC	7%	0%	1%	0%	0%	91%			
	EC with Price Variation	67.90	0.00	1.03	0.00	0.72	155.79	470.93	225.44	696.37
	EC with Discount Rate	-8.01	0.00	0.93	0.00	0.64	113.83	470.93	107.39	578.32
	Price Variation&Discount Rate	19.67	0.00	0.96	0.00	0.67	129.13	470.93	150.43	621.36
PRO_h_2	EC	33.35	0.00	0.95	0.00	1.36	37.96	459.70	73.62	533.32
	Impact categories contribution to EC	45%	0%	1%	0%	2%	52%			
	EC with Price Variation	145.61	0.00	1.22	0.00	1.58	69.99	459.70	218.40	678.10
	EC with Discount Rate	-1.49	0.00	0.87	0.00	1.29	28.02	459.70	28.69	488.39
	Price Variation&Discount Rate	52.14	0.00	1.00	0.00	1.40	43.32	459.70	97.86	557.56
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
PRO_uh_1	EC	7.11	0.00	0.76	0.00	0.52	44.64	313.02	53.04	366.06

	Impact categories contribution to EC	13%	0%	1%	0%	1%	84%			
	EC with Price Variation	48.81	0.00	0.78	0.00	0.54	76.66	313.02	126.80	439.82
	EC with Discount Rate	-5.83	0.00	0.75	0.00	0.52	34.70	313.02	30.14	343.16
	Price Variation&Discount Rate	14.09	0.00	0.76	0.00	0.53	50.00	313.02	65.39	378.41
PRO_uh_2	EC	18.97	0.00	0.63	0.00	0.91	37.92	397.33	58.44	455.77
	Impact categories contribution to EC	32%	0%	1%	0%	2%	65%			
	EC with Price Variation	75.11	0.00	0.72	0.00	0.99	69.95	397.33	146.77	544.10
	EC with Discount Rate	1.55	0.00	0.61	0.00	0.89	27.98	397.33	31.03	428.36
	Price Variation&Discount Rate	28.37	0.00	0.65	0.00	0.93	43.29	397.33	73.23	470.56
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FRO_mass_1	EC	47.25	0.00	1.01	0.01	2.87	0.40	224.34	51.54	275.88
	Impact categories contribution to EC	92%	0%	2%	0%	6%	1%			
	EC with Price Variation	85.80	0.00	1.57	0.02	3.43	0.76	224.34	91.58	315.92
	EC with Discount Rate	35.29	0.00	0.84	0.01	2.69	0.29	224.34	39.11	263.45

	Price Variation&Discount Rate	53.71	0.00	1.10	0.01	2.96	0.46	224.34	58.24	282.58
FRO_mass_2	EC	57.33	0.00	1.36	0.02	1.63	0.16	493.10	60.50	553.60
	Impact categories contribution to EC	95%	0%	2%	0%	3%	0%			
	EC with Price Variation	84.59	0.00	1.77	0.04	2.03	0.20	493.10	88.63	581.73
	EC with Discount Rate	48.87	0.00	1.23	0.01	1.51	0.15	493.10	51.77	544.87
	Price Variation&Discount Rate	61.90	0.00	1.43	0.02	1.70	0.17	493.10	65.21	558.31
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FRO_wood_1	EC	18.82	0.00	0.67	0.01	0.78	106.97	254.34	127.23	381.57
	Impact categories contribution to EC	15%	0%	1%	0%	1%	84%			
	EC with Price Variation	80.12	0.00	1.10	0.01	1.21	107.32	254.34	189.77	444.11
	EC with Discount Rate	-0.21	0.00	0.53	0.00	0.64	106.86	254.34	107.83	362.17
	Price Variation&Discount Rate	29.08	0.00	0.74	0.01	0.85	107.03	254.34	137.70	392.04
FRO_wood_2	EC	36.71	0.00	1.30	0.01	1.80	38.00	588.56	77.84	666.40
	Impact categories	47%	0%	2%	0%	2%	49%			

	contribution to EC									
	EC with Price Variation	187.73	0.00	1.75	0.03	2.21	70.05	588.56	261.77	850.33
	EC with Discount Rate	-10.16	0.00	1.17	0.01	1.67	28.06	588.56	20.75	609.31
	Price Variation&Discount Rate	62.00	0.00	1.38	0.02	1.87	43.37	588.56	108.63	697.19
FRO_wood_3	EC	34.44	0.00	1.08	0.01	2.84	0.38	€ 189.36	€ 38.74	228.10
	Impact categories contribution to EC	89%	0%	3%	0%	7%	1%			
	EC with Price Variation	130.27	0.00	1.58	0.02	3.34	0.73	189.36	135.94	325.30
	EC with Discount Rate	4.70	0.00	0.92	0.01	2.68	0.27	189.36	8.57	197.93
	Price Variation&Discount Rate	50.48	0.00	1.16	0.01	2.92	0.44	189.36	55.02	244.38
FRO_wood_4	EC	38.16	0.00	1.54	0.02	2.06	0.12	415.30	41.89	457.19
	Impact categories contribution to EC	91%	0%	4%	0%	5%	0%			
	EC with Price Variation	189.91	0.00	1.95	0.04	2.44	0.15	415.30	194.49	609.79
	EC with Discount Rate	-8.94	0.00	1.41	0.01	1.94	0.11	415.30	-5.47	409.83
	Price Variation&Discount Rate	63.57	0.00	1.61	0.02	2.12	0.12	415.30	67.44	482.74

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
EW_mas_1	EC	29.66	0.00	1.34	0.01	0.72	0.86	309.24	32.59	341.83
	Impact categories contribution to EC	91%	0%	4%	0%	2%	3%			
	EC with Price Variation	38.48	0.00	1.99	0.01	1.11	1.35	309.24	42.93	352.17
	EC with Discount Rate	26.34	0.00	1.11	0.00	0.59	0.68	309.24	28.72	337.96
	Price Variation&Discount Rate	31.28	0.00	1.46	0.01	0.79	0.95	309.24	34.48	343.72
EW_mas_2	EC	26.57	0.00	1.02	0.00	0.74	66.48	406.05	94.82	500.87
	Impact categories contribution to EC	28%	0%	1%	0%	1%	70%			
	EC with Price Variation	26.79	0.00	1.14	0.00	0.90	66.51	406.05	95.34	501.39
	EC with Discount Rate	26.50	0.00	0.98	0.00	0.70	66.48	406.05	94.65	500.70
	Price Variation&Discount Rate	26.60	0.00	1.04	0.00	0.77	66.49	406.05	94.90	500.95
EW_mas_3	EC	41.08	0.00	1.96	0.01	1.02	1.62	€ 264.03	€ 45.69	309.72
	Impact categories contribution to EC	90%	0%	4%	0%	2%	4%			

	EC with Price Variation	62.94	0.00	3.32	0.01	1.66	2.59	264.03	70.53	334.56
	EC with Discount Rate	33.18	0.00	1.47	0.01	0.79	1.26	264.03	36.71	300.74
	Price Variation&Discount Rate	45.02	0.00	2.20	0.01	1.14	1.80	264.03	50.16	314.19
EW_mas_4	EC	28.86	0.00	0.92	0.00	1.00	104.34	402.90	135.12	538.02
	Impact categories contribution to EC	21%	0%	1%	0%	1%	77%			
	EC with Price Variation	103.68	0.00	1.47	0.01	1.24	136.38	402.90	242.77	645.67
	EC with Discount Rate	5.64	0.00	0.75	0.00	0.93	94.39	402.90	101.71	504.61
	Price Variation&Discount Rate	41.39	0.00	1.01	0.00	1.04	109.70	402.90	153.15	556.05
EW_mas_5	EC	42.27	0.00	1.28	0.01	0.88	1.74	263.58	46.18	309.76
	Impact categories contribution to EC	92%	0%	3%	0%	2%	4%			
	EC with Price Variation	64.00	0.00	2.29	0.01	1.53	3.06	263.58	70.89	334.47
	EC with Discount Rate	35.53	0.00	0.97	0.01	0.67	1.33	263.58	38.51	302.09
	Price Variation&Discount Rate	45.91	0.00	1.45	0.01	0.99	1.96	263.58	50.32	313.90
EW_mas_6	EC	44.62	0.00	0.73	0.00	0.81	66.87	329.43	113.03	442.46
	Impact categories	39%	0%	1%	0%	1%	59%			

	contribution to EC									
	EC with Price Variation	49.46	0.00	0.91	0.00	0.99	66.89	329.43	118.26	447.69
	EC with Discount Rate	43.11	0.00	0.67	0.00	0.76	66.87	329.43	111.41	440.84
	Price Variation&Discount Rate	45.43	0.00	0.76	0.00	0.84	66.88	329.43	113.91	443.34
EW_mas_7	EC	33.82	0.00	1.81	0.01	1.01	0.87	€ 297.09	€ 37.51	334.60
	Impact categories contribution to EC	90%	0%	5%	0%	3%	2%			
	EC with Price Variation	53.28	0.00	3.12	0.01	1.65	1.56	297.09	59.62	356.71
	EC with Discount Rate	27.78	0.00	1.40	0.01	0.81	0.65	297.09	30.64	327.73
	Price Variation&Discount Rate	37.08	0.00	2.03	0.01	1.12	0.98	297.09	41.21	338.30
EW_mas_8	EC	49.42	0.00	1.54	0.01	1.79	104.39	592.80	157.14	749.94
	Impact categories contribution to EC	31%	0%	1%	0%	1%	66%			
	EC with Price Variation	122.43	0.00	1.81	0.01	2.03	136.43	592.80	262.72	855.52
	EC with Discount Rate	26.75	0.00	1.46	0.01	1.71	94.45	592.80	124.38	717.18
	Price Variation&Discount Rate	61.64	0.00	1.59	0.01	1.83	109.76	592.80	174.82	767.62

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
EW_wood_1	EC	8.21	0.00	0.84	0.00	0.98	117.04	228.84	127.07	355.91
	Impact categories contribution to EC	6%	0%	1%	0%	1%	92%			
	EC with Price Variation	71.65	0.00	1.21	0.00	1.42	139.95	228.84	214.24	443.08
	EC with Discount Rate	-11.57	0.00	0.70	0.00	0.82	108.53	228.84	98.48	327.32
	Price Variation&Discount Rate	18.85	0.00	0.90	0.00	1.06	121.23	228.84	142.05	370.89
EW_wood_2	EC	22.88	0.00	0.81	0.01	1.11	183.39	430.48	208.19	638.67
	Impact categories contribution to EC	11%	0%	0%	0%	1%	88%			
	EC with Price Variation	115.93	0.00	1.09	0.01	1.33	215.41	430.48	333.76	764.24
	EC with Discount Rate	-5.99	0.00	0.73	0.00	1.04	173.45	430.48	169.22	599.70
	Price Variation&Discount Rate	38.46	0.00	0.86	0.01	1.14	188.75	430.48	229.22	659.70
EW_wood_3	EC	25.73	0.00	1.74	0.01	1.14	0.84	287.89	29.46	317.35
	Impact categories contribution to EC	87%	0%	6%	0%	4%	3%			
	EC with Price Variation	87.97	0.00	2.64	0.01	1.58	1.34	287.89	93.53	381.42

	EC with Discount Rate	5.67	0.00	1.42	0.01	0.98	0.66	287.89	8.72	296.61
	Price Variation&Discount Rate	36.34	0.00	1.90	0.01	1.21	0.93	287.89	40.40	328.29
EW_wood_4	EC	25.26	0.00	1.49	0.01	2.00	104.31	620.13	133.06	753.19
	Impact categories contribution to EC	19%	0%	1%	0%	2%	78%			
	EC with Price Variation	205.94	0.00	1.72	0.01	2.18	136.35	620.13	346.19	966.32
	EC with Discount Rate	-30.82	0.00	1.42	0.01	1.94	94.37	620.13	66.92	687.05
	Price Variation&Discount Rate	55.51	0.00	1.53	0.01	2.03	109.68	620.13	168.75	788.88
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SW_mas_1	EC	13.67	0.00	0.37	0.00	0.27	0.04	129.25	14.36	143.61
	Impact categories contribution to EC	95%	0%	3%	0%	2%	0%			
	EC with Price Variation	14.35	0.00	0.50	0.00	0.40	0.06	129.25	15.32	144.57
	EC with Discount Rate	13.44	0.00	0.32	0.00	0.23	0.04	129.25	14.03	143.28
	Price Variation&Discount Rate	13.79	0.00	0.39	0.00	0.29	0.05	129.25	14.52	143.77
SW_mas_2	EC	23.84	0.00	0.65	0.00	0.48	0.08	191.69	25.05	216.74

	Impact categories contribution to EC	95%	0%	3%	0%	2%	0%			
	EC with Price Variation	25.41	0.00	0.93	0.00	0.71	0.11	191.69	27.16	218.85
	EC with Discount Rate	23.35	0.00	0.57	0.00	0.41	0.06	191.69	24.39	216.08
	Price Variation&Discount Rate	24.10	0.00	0.70	0.00	0.52	0.08	191.69	25.40	217.09
SW_mas_3	EC	8.04	0.00	0.24	0.00	0.14	0.03	90.92	8.45	99.37
	Impact categories contribution to EC	95%	0%	3%	0%	2%	0%			
	EC with Price Variation	9.79	0.00	0.44	0.00	0.17	0.04	90.92	10.45	101.37
	EC with Discount Rate	7.48	0.00	0.18	0.00	0.12	0.03	90.92	7.81	98.73
	Price Variation&Discount Rate	8.34	0.00	0.27	0.00	0.14	0.03	90.92	8.79	99.71
SW_mas_4	EC	17.50	0.00	0.51	0.00	0.30	0.10	144.96	18.42	163.38
	Impact categories contribution to EC	95%	0%	3%	0%	2%	1%			
	EC with Price Variation	21.49	0.00	0.96	0.00	0.41	0.12	144.96	22.98	167.94
	EC with Discount Rate	16.27	0.00	0.37	0.00	0.27	0.09	144.96	17.00	161.96
	Price Variation&Discount Rate	18.17	0.00	0.59	0.00	0.32	0.10	144.96	19.18	164.14

SW_mas_5	EC	10.07	0.00	0.19	0.00	0.16	0.09	103.17	10.51	113.68
	Impact categories contribution to EC	96%	0%	2%	0%	1%	1%			
	EC with Price Variation	10.88	0.00	0.27	0.00	0.21	0.10	103.17	11.46	114.63
	EC with Discount Rate	9.82	0.00	0.17	0.00	0.14	0.09	103.17	10.22	113.39
	Price Variation&Discount Rate	10.21	0.00	0.20	0.00	0.17	0.09	103.17	10.67	113.84
SW_mas_6	EC	47.78	0.00	0.72	0.00	0.66	0.53	245.01	49.70	294.71
	Impact categories contribution to EC	96%	0%	1%	0%	1%	1%			
	EC with Price Variation	50.45	0.00	0.99	0.00	0.86	0.55	245.01	52.86	297.87
	EC with Discount Rate	46.95	0.00	0.64	0.00	0.60	0.52	245.01	48.72	293.73
	Price Variation&Discount Rate	48.23	0.00	0.77	0.00	0.70	0.53	245.01	50.23	295.24
SW_mas_7	EC	13.09	0.00	0.41	0.00	0.38	0.05	149.35	13.93	163.28
	Impact categories contribution to EC	94%	0%	3%	0%	3%	0%			
	EC with Price Variation	14.09	0.00	0.48	0.00	0.43	0.06	149.35	15.06	164.41
	EC with Discount Rate	12.78	0.00	0.39	0.00	0.36	0.05	149.35	13.58	162.93

	Price Variation&Discount Rate	13.26	0.00	0.42	0.00	0.39	0.05	149.35	14.12	163.47
SW_mas_8	EC	38.06	0.00	1.14	0.01	1.09	0.15	256.44	40.44	296.88
	Impact categories contribution to EC	94%	0%	3%	0%	3%	0%			
	EC with Price Variation	40.24	0.00	1.30	0.01	1.21	0.17	256.44	42.93	299.37
	EC with Discount Rate	37.38	0.00	1.08	0.01	1.05	0.15	256.44	39.67	296.11
	Price Variation&Discount Rate	38.43	0.00	1.16	0.01	1.11	0.15	256.44	40.86	297.30
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SW_wood_1	EC	4.12	0.00	0.20	0.00	0.17	0.01	98.38	4.50	102.88
	Impact categories contribution to EC	92%	0%	4%	0%	4%	0%			
	EC with Price Variation	16.45	0.00	0.29	0.00	0.23	0.01	98.38	16.97	115.35
	EC with Discount Rate	0.27	0.00	0.17	0.00	0.15	0.01	98.38	0.61	98.99
	Price Variation&Discount Rate	6.19	0.00	0.22	0.00	0.18	0.01	98.38	6.59	104.97
SW_wood_2	EC	21.30	0.00	0.66	0.00	0.89	0.06	275.35	22.92	298.27
	Impact categories	93%	0%	3%	0%	4%	0%			

	contribution to EC									
	EC with Price Variation	105.00	0.00	0.89	0.00	1.07	0.07	275.35	107.03	382.38
	EC with Discount Rate	-4.67	0.00	0.59	0.00	0.84	0.06	275.35	-3.19	272.16
	Price Variation&Discount Rate	35.32	0.00	0.70	0.00	0.92	0.06	275.35	37.00	312.35
SW_wood_3	EC	4.59	0.00	0.38	0.00	0.45	0.03	117.14	5.46	122.60
	Impact categories contribution to EC	84%	0%	7%	0%	8%	0%			
	EC with Price Variation	47.10	0.00	0.43	0.00	0.48	0.03	117.14	48.04	165.18
	EC with Discount Rate	-8.62	0.00	0.36	0.00	0.45	0.03	117.14	-7.78	109.36
	Price Variation&Discount Rate	11.72	0.00	0.39	0.00	0.46	0.03	117.14	12.59	129.73
SW_wood_4	EC	19.71	0.00	1.25	0.01	1.55	0.09	360.79	22.61	383.40
	Impact categories contribution to EC	87%	0%	6%	0%	7%	0%			
	EC with Price Variation	164.84	0.00	1.45	0.01	1.67	0.11	360.79	168.08	528.87
	EC with Discount Rate	-25.33	0.00	1.19	0.00	1.51	0.09	360.79	-22.53	338.26
	Price Variation&Discount Rate	44.01	0.00	1.29	0.01	1.57	0.10	360.79	46.97	407.76

Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
IW_mas_1	EC	8.00	0.00	0.24	0.00	0.16	0.03	122.46	8.45	130.91
	Impact categories contribution to EC	95%	0%	3%	0%	2%	0%			
	EC with Price Variation	7.47	0.00	0.29	0.00	0.21	0.04	122.46	8.00	130.46
	EC with Discount Rate	8.17	0.00	0.23	0.00	0.15	0.03	122.46	8.58	131.04
	Price Variation&Discount Rate	7.91	0.00	0.25	0.00	0.17	0.03	122.46	8.37	130.83
IW_mas_2	EC	16.89	0.00	0.51	0.00	0.35	0.08	174.01	17.83	191.84
	Impact categories contribution to EC	95%	0%	3%	0%	2%	0%			
	EC with Price Variation	15.85	0.00	0.61	0.00	0.45	0.10	174.01	17.01	191.02
	EC with Discount Rate	17.21	0.00	0.48	0.00	0.31	0.08	174.01	18.09	192.10
	Price Variation&Discount Rate	16.72	0.00	0.53	0.00	0.36	0.09	174.01	17.69	191.70
IW_mas_3	EC	8.32	0.00	0.20	0.00	0.14	0.03	102.56	8.69	111.25
	Impact categories contribution to EC	96%	0%	2%	0%	2%	0%			
	EC with Price Variation	9.81	0.00	0.38	0.00	0.17	0.04	102.56	10.41	112.97

	EC with Discount Rate	7.86	0.00	0.15	0.00	0.13	0.03	102.56	8.16	110.72
	Price Variation&Discount Rate	8.57	0.00	0.23	0.00	0.14	0.03	102.56	8.98	111.54
IW_mas_4	EC	18.06	0.00	0.44	0.00	0.31	0.09	148.28	18.91	167.19
	Impact categories contribution to EC	96%	0%	2%	0%	2%	0%			
	EC with Price Variation	21.26	0.00	0.82	0.00	0.40	0.12	148.28	22.59	170.87
	EC with Discount Rate	17.07	0.00	0.33	0.00	0.28	0.09	148.28	17.77	166.05
	Price Variation&Discount Rate	18.60	0.00	0.51	0.00	0.32	0.10	148.28	19.53	167.81
IW_mas_5	EC	10.35	0.00	0.16	0.00	0.16	0.09	118.02	10.76	128.78
	Impact categories contribution to EC	96%	0%	1%	0%	1%	1%			
	EC with Price Variation	10.77	0.00	0.20	0.00	0.20	0.10	118.02	11.26	129.28
	EC with Discount Rate	10.22	0.00	0.14	0.00	0.15	0.09	118.02	10.61	128.63
	Price Variation&Discount Rate	10.42	0.00	0.16	0.00	0.17	0.09	118.02	10.84	128.86
IW_mas_6	EC	25.86	0.00	0.37	0.00	0.38	0.27	171.18	26.87	198.05
	Impact categories contribution to EC	96%	0%	1%	0%	1%	1%			

	EC with Price Variation	27.00	0.00	0.49	0.00	0.48	0.28	171.18	28.25	199.43
	EC with Discount Rate	25.51	0.00	0.33	0.00	0.34	0.26	171.18	26.45	197.63
	Price Variation&Discount Rate	26.05	0.00	0.39	0.00	0.39	0.27	171.18	27.10	198.28
IW_mas_7	EC	12.52	0.00	0.35	0.00	0.36	0.05	128.76	13.29	142.05
	Impact categories contribution to EC	94%	0%	3%	0%	3%	0%			
	EC with Price Variation	13.03	0.00	0.38	0.00	0.39	0.06	128.76	13.86	142.62
	EC with Discount Rate	12.37	0.00	0.35	0.00	0.35	0.05	128.76	13.11	141.87
	Price Variation&Discount Rate	12.61	0.00	0.36	0.00	0.36	0.05	128.76	13.38	142.14
IW_mas_8	EC	32.75	0.00	0.90	0.01	0.92	0.12	250.99	34.70	285.69
	Impact categories contribution to EC	94%	0%	3%	0%	3%	0%			
	EC with Price Variation	33.98	0.00	0.99	0.01	1.02	0.14	250.99	36.12	287.11
	EC with Discount Rate	32.37	0.00	0.88	0.01	0.89	0.12	250.99	34.26	285.25
	Price Variation&Discount Rate	32.95	0.00	0.92	0.01	0.94	0.13	250.99	34.94	285.93
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2

IW_wood_1	EC	2.63	0.00	0.12	0.00	0.12	0.01	77.28	2.88	80.16
	Impact categories contribution to EC	91%	0%	4%	0%	4%	0%			
	EC with Price Variation	14.10	0.00	0.16	0.00	0.16	0.01	77.28	14.43	91.71
	EC with Discount Rate	-0.93	0.00	0.11	0.00	0.11	0.01	77.28	-0.70	76.58
	Price Variation&Discount Rate	4.55	0.00	0.13	0.00	0.13	0.01	77.28	4.82	82.10
IW_wood_2	EC	27.07	0.00	0.77	0.00	1.10	0.07	224.77	29.02	253.79
	Impact categories contribution to EC	93%	0%	3%	0%	4%	0%			
	EC with Price Variation	122.03	0.00	0.99	0.00	1.29	0.08	224.77	124.39	349.16
	EC with Discount Rate	-2.40	0.00	0.70	0.00	1.04	0.07	224.77	-0.58	224.19
	Price Variation&Discount Rate	42.97	0.00	0.80	0.00	1.13	0.07	224.77	44.99	269.76
IW_wood_3	EC	4.65	0.00	0.37	0.00	0.50	0.03	110.08	5.55	115.63
	Impact categories contribution to EC	84%	0%	7%	0%	9%	1%			
	EC with Price Variation	53.29	0.00	0.39	0.00	0.51	0.03	110.08	54.22	164.30
	EC with Discount Rate	-10.45	0.00	0.37	0.00	0.50	0.03	110.08	-9.55	100.53

	Price Variation&Discount Rate	12.79	0.00	0.38	0.00	0.50	0.03	110.08	13.70	123.78
IW_wood_4	EC	27.61	0.00	1.34	0.01	1.74	0.10	439.35	30.80	470.15
	Impact categories contribution to EC	90%	0%	4%	0%	6%	0%			
	EC with Price Variation	186.42	0.00	1.54	0.01	1.90	0.12	439.35	189.99	629.34
	EC with Discount Rate	-21.68	0.00	1.28	0.01	1.69	0.10	439.35	-18.61	420.74
	Price Variation&Discount Rate	54.20	0.00	1.37	0.01	1.77	0.11	439.35	57.45	496.80
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CW_h_1	EC	36.11	0.00	1.07	0.01	1.46	0.98	373.16	39.62	412.78
	Impact categories contribution to EC	91%	0%	3%	0%	4%	2%			
	EC with Price Variation	39.62	0.00	1.33	0.01	2.19	1.51	373.16	44.66	417.82
	EC with Discount Rate	34.71	0.00	0.99	0.00	1.20	0.78	373.16	37.68	410.84
	Price Variation&Discount Rate	36.77	0.00	1.12	0.01	1.59	1.08	373.16	40.56	413.72
CW_h_2	EC	47.94	0.00	0.98	0.01	1.71	0.95	374.12	51.58	425.70
	Impact categories	93%	0%	2%	0%	3%	2%			

	contribution to EC									
	EC with Price Variation	76.11	0.00	1.37	0.01	2.67	1.48	374.12	81.65	455.77
	EC with Discount Rate	38.09	0.00	0.85	0.00	1.36	0.75	374.12	41.06	415.18
	Price Variation&Discount Rate	52.93	0.00	1.05	0.01	1.89	1.04	374.12	56.92	431.04
CW_h_3	EC	65.68	0.00	1.00	0.01	2.08	0.94	291.76	69.70	361.46
	Impact categories contribution to EC	94%	0%	1%	0%	3%	1%			
	EC with Price Variation	121.98	0.00	1.80	0.01	3.32	1.49	291.76	128.60	420.36
	EC with Discount Rate	46.29	0.00	0.72	0.01	1.63	0.73	291.76	49.38	341.14
	Price Variation&Discount Rate	75.58	0.00	1.14	0.01	2.31	1.04	291.76	80.07	371.83
CW_h_4	EC	80.95	0.00	1.30	0.01	2.39	1.02	378.81	85.67	464.48
	Impact categories contribution to EC	94%	0%	2%	0%	3%	1%			
	EC with Price Variation	144.48	0.00	2.35	0.01	3.77	1.59	378.81	152.20	531.01
	EC with Discount Rate	59.13	0.00	0.95	0.01	1.89	0.81	378.81	62.78	441.59
	Price Variation&Discount Rate	92.11	0.00	1.48	0.01	2.64	1.13	378.81	97.37	476.18
CW_h_5	EC	51.50	0.00	0.74	0.01	1.49	1.22	325.23	54.96	380.19

	Impact categories contribution to EC	94%	0%	1%	0%	3%	2%			
	EC with Price Variation	67.64	0.00	1.07	0.01	2.34	1.85	325.23	72.90	398.13
	EC with Discount Rate	46.18	0.00	0.64	0.00	1.21	1.01	325.23	49.04	374.27
	Price Variation&Discount Rate	54.28	0.00	0.80	0.01	1.64	1.33	325.23	58.05	383.28
CW_h_6	EC	59.56	0.00	0.81	0.01	1.76	1.19	335.76	63.33	399.09
	Impact categories contribution to EC	94%	0%	1%	0%	3%	2%			
	EC with Price Variation	90.58	0.00	1.24	0.01	2.74	1.72	335.76	96.29	432.05
	EC with Discount Rate	48.84	0.00	0.66	0.00	1.41	0.99	335.76	51.90	387.66
	Price Variation&Discount Rate	65.03	0.00	0.89	0.01	1.94	1.29	335.76	69.15	404.91
CW_h_7	EC	54.48	0.00	0.89	0.01	2.14	0.10	276.84	57.62	334.46
	Impact categories contribution to EC	95%	0%	2%	0%	4%	0%			
	EC with Price Variation	95.71	0.00	1.22	0.01	3.20	0.13	276.84	100.27	377.11
	EC with Discount Rate	40.29	0.00	0.78	0.00	1.74	0.09	276.84	42.91	319.75
	Price Variation&Discount Rate	61.73	0.00	0.95	0.01	2.33	0.11	276.84	65.13	341.97

CW_h_8	EC	85.67	0.00	1.67	0.01	3.00	0.21	382.18	90.56	472.74
	Impact categories contribution to EC	95%	0%	2%	0%	3%	0%			
	EC with Price Variation	133.07	0.00	2.08	0.01	4.19	0.25	382.18	139.60	521.78
	EC with Discount Rate	69.38	0.00	1.52	0.01	2.56	0.20	382.18	73.67	455.85
	Price Variation&Discount Rate	94.01	0.00	1.74	0.01	3.21	0.22	382.18	99.19	481.37
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CW_uh_1	EC	28.52	0.00	0.69	0.00	1.26	0.91	252.90	31.39	284.29
	Impact categories contribution to EC	91%	0%	2%	0%	4%	3%			
	EC with Price Variation	40.56	0.00	0.94	0.01	1.97	1.44	252.90	44.91	297.81
	EC with Discount Rate	24.25	0.00	0.60	0.00	1.00	0.72	252.90	26.58	279.48
	Price Variation&Discount Rate	30.67	0.00	0.73	0.00	1.39	1.01	252.90	33.81	286.71
CW_uh_2	EC	43.09	0.00	1.15	0.01	1.54	0.98	407.86	46.77	454.63
	Impact categories contribution to EC	92%	0%	2%	0%	3%	2%			
	EC with Price Variation	55.30	0.00	1.49	0.01	2.44	1.62	407.86	60.85	468.71

	EC with Discount Rate	39.00	0.00	1.04	0.00	1.24	0.77	407.86	42.06	449.92
	Price Variation&Discount Rate	45.22	0.00	1.21	0.01	1.70	1.10	407.86	49.22	457.08
CW_uh_3	EC	28.34	0.00	0.58	0.00	1.18	0.90	194.94	31.01	225.95
	Impact categories contribution to EC	91%	0%	2%	0%	4%	3%			
	EC with Price Variation	46.18	0.00	1.13	0.01	1.97	1.54	194.94	50.82	245.76
	EC with Discount Rate	22.50	0.00	0.41	0.00	0.92	0.69	194.94	24.52	219.46
	Price Variation&Discount Rate	31.41	0.00	0.68	0.00	1.32	1.01	194.94	34.42	229.36
CW_uh_4	EC	38.52	0.00	0.83	0.00	1.36	0.99	261.49	41.71	303.20
	Impact categories contribution to EC	92%	0%	2%	0%	3%	2%			
	EC with Price Variation	58.12	0.00	1.58	0.01	2.22	1.63	261.49	63.55	325.04
	EC with Discount Rate	32.13	0.00	0.59	0.00	1.08	0.77	261.49	34.58	296.07
	Price Variation&Discount Rate	41.88	0.00	0.96	0.01	1.51	1.10	261.49	45.45	306.94
CW_uh_5	EC	37.94	0.00	0.56	0.00	1.31	1.08	267.26	40.90	308.16
	Impact categories contribution to EC	93%	0%	1%	0%	3%	3%			

	EC with Price Variation	53.75	0.00	0.85	0.01	2.12	1.70	267.26	58.43	325.69
	EC with Discount Rate	32.73	0.00	0.47	0.00	1.04	0.87	267.26	35.11	302.37
	Price Variation&Discount Rate	40.67	0.00	0.61	0.01	1.45	1.19	267.26	43.93	311.19
CW_uh_6	EC	61.15	0.00	0.86	0.01	1.61	1.37	334.46	64.99	399.45
	Impact categories contribution to EC	94%	0%	1%	0%	2%	2%			
	EC with Price Variation	77.98	0.00	1.25	0.01	2.52	2.00	334.46	83.76	418.22
	EC with Discount Rate	55.62	0.00	0.73	0.01	1.31	1.16	334.46	58.82	393.28
	Price Variation&Discount Rate	64.04	0.00	0.92	0.01	1.77	1.48	334.46	68.22	402.68
CW_uh_7	EC	17.14	0.00	0.48	0.00	1.23	0.07	180.02	18.93	198.95
	Impact categories contribution to EC	91%	0%	3%	0%	7%	0%			
	EC with Price Variation	18.29	0.00	0.52	0.00	1.82	0.08	180.02	20.72	200.74
	EC with Discount Rate	16.78	0.00	0.47	0.00	1.03	0.07	180.02	18.35	198.37
	Price Variation&Discount Rate	17.34	0.00	0.49	0.00	1.34	0.07	180.02	19.24	199.26
CW_uh_8	EC	43.25	0.00	1.20	0.01	1.97	0.17	277.10	46.60	323.70
	Impact categories	93%	0%	3%	0%	4%	0%			

	contribution to EC									
	EC with Price Variation	45.04	0.00	1.28	0.01	2.53	0.19	277.10	49.05	326.15
	EC with Discount Rate	42.68	0.00	1.17	0.01	1.77	0.17	277.10	45.79	322.89
	Price Variation&Discount Rate	43.55	0.00	1.21	0.01	2.07	0.18	277.10	47.02	324.12
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SCW_h_1	EC	18.76	0.00	0.87	0.00	0.46	0.07	139.87	20.15	160.02
	Impact categories contribution to EC	93%	0%	4%	0%	2%	0%			
	EC with Price Variation	22.64	0.00	1.31	0.00	0.70	0.10	139.87	24.75	164.62
	EC with Discount Rate	17.35	0.00	0.71	0.00	0.37	0.05	139.87	18.49	158.36
	Price Variation&Discount Rate	19.46	0.00	0.95	0.00	0.50	0.07	139.87	20.98	160.85
SCW_h_2	EC	41.37	0.00	0.75	0.00	0.89	0.09	217.38	43.10	260.48
	Impact categories contribution to EC	96%	0%	2%	0%	2%	0%			
	EC with Price Variation	62.03	0.00	1.07	0.00	1.37	0.13	217.38	64.60	281.98
	EC with Discount Rate	34.27	0.00	0.64	0.00	0.73	0.07	217.38	35.72	253.10

	Price Variation&Discount Rate	45.01	0.00	0.80	0.00	0.97	0.09	217.38	46.88	264.26
SCW_h_3	EC	12.57	0.00	0.75	0.00	0.31	0.05	69.32	13.68	83.00
	Impact categories contribution to EC	92%	0%	5%	0%	2%	0%			
	EC with Price Variation	17.60	0.00	1.26	0.00	0.46	0.08	69.32	19.40	88.72
	EC with Discount Rate	10.79	0.00	0.56	0.00	0.25	0.04	69.32	11.65	80.97
	Price Variation&Discount Rate	13.47	0.00	0.84	0.00	0.33	0.06	69.32	14.70	84.02
SCW_h_4	EC	36.74	0.00	0.63	0.00	0.76	0.11	170.67	38.23	208.90
	Impact categories contribution to EC	96%	0%	2%	0%	2%	0%			
	EC with Price Variation	61.63	0.00	1.13	0.00	1.13	0.14	170.67	64.04	234.71
	EC with Discount Rate	28.26	0.00	0.46	0.00	0.62	0.10	170.67	29.44	200.11
	Price Variation&Discount Rate	41.09	0.00	0.71	0.00	0.82	0.12	170.67	42.75	213.42
SCW_h_5	EC	15.44	0.00	0.33	0.00	0.25	0.14	143.88	16.17	160.05
	Impact categories contribution to EC	96%	0%	2%	0%	2%	1%			
	EC with Price Variation	16.76	0.00	0.46	0.00	0.32	0.15	143.88	17.70	161.58

	EC with Discount Rate	14.98	0.00	0.29	0.00	0.22	0.14	143.88	15.63	159.51
	Price Variation&Discount Rate	15.67	0.00	0.36	0.00	0.26	0.15	143.88	16.44	160.32
SCW_h_6	EC	46.65	0.00	0.61	0.00	0.62	0.53	212.08	48.41	260.49
	Impact categories contribution to EC	96%	0%	1%	0%	1%	1%			
	EC with Price Variation	48.34	0.00	0.78	0.00	0.78	0.54	212.08	50.45	262.53
	EC with Discount Rate	46.12	0.00	0.56	0.00	0.57	0.52	212.08	47.78	259.86
	Price Variation&Discount Rate	46.93	0.00	0.64	0.00	0.65	0.53	212.08	48.75	260.83
SCW_h_7	EC	18.75	0.00	0.96	0.00	0.58	0.08	161.93	20.37	182.30
	Impact categories contribution to EC	92%	0%	5%	0%	3%	0%			
	EC with Price Variation	23.16	0.00	1.37	0.00	0.76	0.10	161.93	25.39	187.32
	EC with Discount Rate	17.15	0.00	0.82	0.00	0.52	0.07	161.93	18.55	180.48
	Price Variation&Discount Rate	19.54	0.00	1.04	0.00	0.61	0.08	161.93	21.28	183.21
SCW_h_8	EC	57.29	0.00	1.25	0.01	1.54	0.16	282.15	60.25	342.40
	Impact categories contribution to EC	95%	0%	2%	0%	3%	0%			

	EC with Price Variation	80.38	0.00	1.48	0.01	1.93	0.19	282.15	83.99	366.14
	EC with Discount Rate	49.38	0.00	1.17	0.01	1.40	0.16	282.15	52.11	334.26
	Price Variation&Discount Rate	61.35	0.00	1.29	0.01	1.61	0.17	282.15	64.42	346.57
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
SCW_uh_1	EC	13.10	0.00	0.31	0.00	0.25	0.04	108.66	13.71	122.37
	Impact categories contribution to EC	96%	0%	2%	0%	2%	0%			
	EC with Price Variation	13.43	0.00	0.41	0.00	0.36	0.06	108.66	14.27	122.93
	EC with Discount Rate	13.00	0.00	0.28	0.00	0.22	0.04	108.66	13.54	122.20
	Price Variation&Discount Rate	13.16	0.00	0.33	0.00	0.27	0.04	108.66	13.81	122.47
SCW_uh_2	EC	22.71	0.00	0.54	0.00	0.44	0.07	158.76	23.76	182.52
	Impact categories contribution to EC	96%	0%	2%	0%	2%	0%			
	EC with Price Variation	23.30	0.00	0.72	0.00	0.63	0.10	158.76	24.75	183.51
	EC with Discount Rate	22.52	0.00	0.49	0.00	0.38	0.06	158.76	23.45	182.21
	Price Variation&Discount Rate	22.81	0.00	0.57	0.00	0.47	0.08	158.76	23.93	182.69

SCW_uh_3	EC	6.63	0.00	0.16	0.00	0.09	0.03	38.10	6.92	45.02
	Impact categories contribution to EC	96%	0%	2%	0%	1%	0%			
	EC with Price Variation	7.93	0.00	0.32	0.00	0.11	0.04	38.10	8.39	46.49
	EC with Discount Rate	6.23	0.00	0.12	0.00	0.09	0.02	38.10	6.46	44.56
	Price Variation&Discount Rate	6.85	0.00	0.19	0.00	0.10	0.03	38.10	7.16	45.26
SCW_uh_4	EC	16.37	0.00	0.40	0.00	0.26	0.09	112.03	17.13	129.16
	Impact categories contribution to EC	96%	0%	2%	0%	2%	1%			
	EC with Price Variation	19.37	0.00	0.75	0.00	0.34	0.11	112.03	20.58	132.61
	EC with Discount Rate	15.44	0.00	0.29	0.00	0.24	0.08	112.03	16.06	128.09
	Price Variation&Discount Rate	16.87	0.00	0.46	0.00	0.28	0.10	112.03	17.71	129.74
SCW_uh_5	EC	14.03	0.00	0.20	0.00	0.20	0.14	103.35	14.56	117.91
	Impact categories contribution to EC	96%	0%	1%	0%	1%	1%			
	EC with Price Variation	14.46	0.00	0.24	0.00	0.24	0.14	103.35	15.08	118.43
	EC with Discount Rate	13.89	0.00	0.18	0.00	0.18	0.14	103.35	14.40	117.75

	Price Variation&Discount Rate	14.10	0.00	0.20	0.00	0.20	0.14	103.35	14.64	117.99
SCW_uh_6	EC	46.65	0.00	0.61	0.00	0.62	0.53	212.08	48.41	260.49
	Impact categories contribution to EC	96%	0%	1%	0%	1%	1%			
	EC with Price Variation	48.34	0.00	0.78	0.00	0.78	0.54	212.08	50.45	262.53
	EC with Discount Rate	46.12	0.00	0.56	0.00	0.57	0.52	212.08	47.78	259.86
	Price Variation&Discount Rate	46.93	0.00	0.64	0.00	0.65	0.53	212.08	48.75	260.83
SCW_uh_7	EC	12.52	0.00	0.35	0.00	0.36	0.05	128.76	13.29	142.05
	Impact categories contribution to EC	94%	0%	3%	0%	3%	0%			
	EC with Price Variation	13.03	0.00	0.38	0.00	0.39	0.06	128.76	13.86	142.62
	EC with Discount Rate	12.37	0.00	0.35	0.00	0.35	0.05	128.76	13.11	141.87
	Price Variation&Discount Rate	12.61	0.00	0.36	0.00	0.36	0.05	128.76	13.38	142.14
SCW_uh_8	EC	36.93	0.00	1.03	0.01	1.05	0.15	223.51	39.15	262.66
	Impact categories contribution to EC	94%	0%	3%	0%	3%	0%			
	EC with Price Variation	38.13	0.00	1.10	0.01	1.13	0.16	223.51	40.53	264.04

	EC with Discount Rate	36.56	0.00	1.00	0.01	1.02	0.14	223.51	38.73	262.24
	Price Variation&Discount Rate	37.13	0.00	1.04	0.01	1.06	0.15	223.51	39.38	262.89
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
FL_mas_1	EC	16.22	0.00	0.44	0.00	0.55	0.06	149.08	17.27	166.35
	Impact categories contribution to EC	94%	0%	3%	0%	3%	0%			
	EC with Price Variation	18.68	0.00	0.49	0.00	0.61	0.07	149.08	19.85	168.93
	EC with Discount Rate	15.46	0.00	0.42	0.00	0.53	0.06	149.08	16.47	165.55
	Price Variation&Discount Rate	16.63	0.00	0.45	0.00	0.56	0.06	149.08	17.70	166.78
FL_mas_2	EC	42.50	0.00	1.13	0.01	1.14	106.77	258.22	151.54	409.76
	Impact categories contribution to EC	28%	0%	1%	0%	1%	70%			
	EC with Price Variation	55.33	0.00	1.36	0.01	1.36	106.79	258.22	164.84	423.06
	EC with Discount Rate	38.52	0.00	1.05	0.01	1.07	106.77	258.22	147.41	405.63
	Price Variation&Discount Rate	44.65	0.00	1.17	0.01	1.17	106.78	258.22	153.77	411.99
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP**	**AP** €/SO2	**EP** €/PO4	**POCP**	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2

			€/R11			€/Ethen				
FL_wood_1	EC	5.22	0.00	0.32	0.00	0.46	158.25	241.13	164.26	405.39
	Impact categories contribution to EC	3%	0%	0%	0%	0%	96%			
	EC with Price Variation	40.50	0.00	0.36	0.00	0.50	158.26	241.13	199.63	440.76
	EC with Discount Rate	-5.73	0.00	0.31	0.00	0.45	158.25	241.13	153.28	394.41
	Price Variation&Discount Rate	11.13	0.00	0.33	0.00	0.47	158.26	241.13	170.18	411.31
FL_wood_2	EC	33.31	0.00	1.03	0.00	1.35	106.74	339.61	142.43	482.04
	Impact categories contribution to EC	23%	0%	1%	0%	1%	75%			
	EC with Price Variation	138.15	0.00	1.35	0.00	1.62	106.75	339.61	247.88	587.49
	EC with Discount Rate	0.77	0.00	0.93	0.00	1.26	106.74	339.61	109.71	449.32
	Price Variation&Discount Rate	50.87	0.00	1.08	0.00	1.39	106.74	339.61	160.09	499.70
FL_wood_3	EC	10.75	0.00	0.70	0.00	0.96	158.29	312.88	170.70	483.58
	Impact categories contribution to EC	6%	0%	0%	0%	1%	93%			
	EC with Price Variation	88.92	0.00	0.75	0.00	1.01	158.29	312.88	248.98	561.86
	EC with Discount Rate	-13.51	0.00	0.68	0.00	0.95	158.28	312.88	146.41	459.29

	Price Variation&Discount Rate	23.84	0.00	0.71	0.00	0.97	158.29	312.88	183.81	496.69
FL_wood_4	EC	49.64	0.00	1.79	0.01	2.20	213.39	381.55	267.02	648.57
	Impact categories contribution to EC	19%	0%	1%	0%	1%	80%			
	EC with Price Variation	205.96	0.00	2.06	0.01	2.43	213.41	381.55	423.86	805.41
	EC with Discount Rate	1.12	0.00	1.70	0.01	2.12	213.39	381.55	218.34	599.89
	Price Variation&Discount Rate	75.81	0.00	1.83	0.01	2.23	213.39	381.55	293.28	674.83
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
TFL_mas_1	EC	26.74	0.00	1.65	0.00	0.84	0.05	159.38	29.29	188.67
	Impact categories contribution to EC	91%	0%	6%	0%	3%	0%			
	EC with Price Variation	27.91	0.00	1.71	0.00	0.91	0.06	159.38	30.60	189.98
	EC with Discount Rate	26.38	0.00	1.63	0.00	0.82	0.05	159.38	28.88	188.26
	Price Variation&Discount Rate	26.94	0.00	1.66	0.00	0.85	0.05	159.38	29.51	188.89
TFL_mas_2	EC	46.13	0.00	1.18	0.01	1.31	0.15	298.10	48.79	346.89
	Impact categories	95%	0%	2%	0%	3%	0%			

	contribution to EC									
	EC with Price Variation	98.27	0.00	1.43	0.01	1.54	0.17	298.10	101.42	399.52
	EC with Discount Rate	29.95	0.00	1.10	0.01	1.24	0.15	298.10	32.45	330.55
	Price Variation&Discount Rate	54.86	0.00	1.22	0.01	1.35	0.16	298.10	57.60	355.70
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
TFL_wood_1	EC	8.83	0.00	0.41	0.00	0.53	0.03	276.24	9.81	286.05
	Impact categories contribution to EC	90%	0%	4%	0%	5%	0%			
	EC with Price Variation	57.11	0.00	0.49	0.00	0.59	0.03	276.24	58.22	334.46
	EC with Discount Rate	-6.15	0.00	0.39	0.00	0.51	0.03	276.24	-5.21	271.03
	Price Variation&Discount Rate	16.92	0.00	0.43	0.00	0.54	0.03	276.24	17.92	294.16
TFL_wood_2	EC	29.41	0.00	0.92	0.00	1.29	0.10	352.06	31.72	383.78
	Impact categories contribution to EC	93%	0%	3%	0%	4%	0%			
	EC with Price Variation	145.33	0.00	1.17	0.00	1.50	0.11	352.06	148.11	500.17
	EC with Discount Rate	-6.57	0.00	0.84	0.00	1.22	0.10	352.06	-4.40	347.66

	Price Variation&Discount Rate	48.82	0.00	0.96	0.00	1.32	0.11	352.06	51.21	403.27
TFL_wood_3	EC	18.73	0.00	1.68	0.00	1.17	79.16	262.62	100.74	363.36
	Impact categories contribution to EC	19%	0%	2%	0%	1%	79%			
	EC with Price Variation	95.18	0.00	1.73	0.00	1.21	79.17	262.62	177.30	439.92
	EC with Discount Rate	-4.99	0.00	1.66	0.00	1.15	79.16	262.62	76.98	339.60
	Price Variation&Discount Rate	31.53	0.00	1.69	0.00	1.17	79.16	262.62	113.56	376.18
TFL_wood_4	EC	28.93	0.00	1.39	0.01	1.79	106.75	490.22	138.86	629.08
	Impact categories contribution to EC	21%	0%	1%	0%	1%	77%			
	EC with Price Variation	200.14	0.00	1.60	0.01	1.97	106.76	490.22	310.49	800.71
	EC with Discount Rate	-24.21	0.00	1.32	0.01	1.73	106.74	490.22	85.60	575.82
	Price Variation&Discount Rate	57.60	0.00	1.42	0.01	1.82	106.75	490.22	167.60	657.82
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CFL mas_1	EC	26.40	0.00	1.01	0.01	0.73	0.83	153.33	28.98	182.31
	Impact categories	91%	0%	3%	0%	3%	3%			

	contribution to EC									
	EC with Price Variation	33.15	0.00	1.23	0.01	0.94	1.30	153.33	36.63	189.96
	EC with Discount Rate	23.98	0.00	0.94	0.00	0.66	0.65	153.33	26.23	179.56
	Price Variation&Discount Rate	27.61	0.00	1.05	0.01	0.77	0.91	153.33	30.35	183.68
CFL mas _2	EC	59.56	0.00	1.54	0.01	1.61	107.56	442.73	170.27	613.00
	Impact categories contribution to EC	35%	0%	1%	0%	1%	63%			
	EC with Price Variation	116.84	0.00	2.06	0.01	2.07	108.03	442.73	229.01	671.74
	EC with Discount Rate	41.45	0.00	1.37	0.01	1.45	107.38	442.73	151.67	594.40
	Price Variation&Discount Rate	69.23	0.00	1.63	0.01	1.68	107.64	442.73	180.20	622.93
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
CFL_wood _1	EC	11.09	0.00	0.56	0.00	0.60	79.15	348.73	91.41	440.14
	Impact categories contribution to EC	12%	0%	1%	0%	1%	87%			
	EC with Price Variation	60.47	0.00	0.65	0.00	0.67	79.15	348.73	140.94	489.67
	EC with Discount Rate	-4.23	0.00	0.54	0.00	0.58	79.15	348.73	76.03	424.76

	Price Variation&Discount Rate	19.36	0.00	0.58	0.00	0.61	79.15	348.73	99.70	448.43
CFL_wood_2	EC	34.98	0.00	1.07	0.00	1.40	106.75	356.49	144.19	500.68
	Impact categories contribution to EC	24%	0%	1%	0%	1%	74%			
	EC with Price Variation	146.33	0.00	1.41	0.01	1.69	106.76	356.49	256.19	612.68
	EC with Discount Rate	0.42	0.00	0.96	0.00	1.31	106.74	356.49	109.44	465.93
	Price Variation&Discount Rate	53.62	0.00	1.12	0.00	1.45	106.75	356.49	162.95	519.44
CFL_wood_3	EC	15.00	0.00	1.14	0.00	1.07	158.30	433.00	175.51	608.51
	Impact categories contribution to EC	9%	0%	1%	0%	1%	90%			
	EC with Price Variation	101.31	0.00	1.22	0.00	1.14	158.31	433.00	261.98	694.98
	EC with Discount Rate	-11.79	0.00	1.12	0.00	1.05	158.30	433.00	148.68	581.68
	Price Variation&Discount Rate	29.45	0.00	1.16	0.00	1.08	158.30	433.00	189.99	622.99
CFL_wood_4	EC	49.64	0.00	1.79	0.01	2.20	213.39	508.35	267.02	775.37
	Impact categories contribution to EC	19%	0%	1%	0%	1%	80%			
	EC with Price Variation	205.96	0.00	2.06	0.01	2.43	213.41	508.35	423.86	932.21

	EC with Discount Rate	1.12	0.00	1.70	0.01	2.12	213.39	508.35	218.34	726.69
	Price Variation&Discount Rate	75.81	0.00	1.83	0.01	2.23	213.39	508.35	293.28	801.63
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
BP_h_1	EC	61.91	0.00	1.41	0.01	1.57	237.47	231.79	302.37	534.16
	Impact categories contribution to EC	20%	0%	0%	0%	1%	79%			
	EC with Price Variation	95.98	0.00	1.82	0.01	2.19	237.50	231.79	337.50	569.29
	EC with Discount Rate	50.27	0.00	1.27	0.01	1.35	237.46	231.79	290.36	522.15
	Price Variation&Discount Rate	67.88	0.00	1.48	0.01	1.68	237.47	231.79	308.52	540.31
BP_h_2	EC	114.06	0.00	2.57	0.01	2.98	320.22	369.18	439.85	809.03
	Impact categories contribution to EC	26%	0%	1%	0%	1%	73%			
	EC with Price Variation	165.57	0.00	3.17	0.02	3.83	320.26	369.18	492.85	862.03
	EC with Discount Rate	96.82	0.00	2.37	0.01	2.69	320.20	369.18	422.10	791.28
	Price Variation&Discount Rate	123.00	0.00	2.67	0.01	3.13	320.23	369.18	449.05	818.23
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP**	**AP** €/SO2	**EP** €/PO4	**POCP**	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2

			€/R11			€/Ethen				
BP_uh_1	EC	31.14	0.00	0.83	0.00	0.90	158.33	139.73	191.19	330.92
	Impact categories contribution to EC	16%	0%	0%	0%	0%	83%			
	EC with Price Variation	34.72	0.00	1.01	0.00	1.08	158.34	139.73	195.15	334.88
	EC with Discount Rate	30.03	0.00	0.77	0.00	0.84	158.32	139.73	189.96	329.69
	Price Variation&Discount Rate	31.74	0.00	0.86	0.00	0.93	158.33	139.73	191.85	331.58
BP_uh_2	EC	79.77	0.00	2.16	0.01	2.16	213.55	297.72	297.65	595.37
	Impact categories contribution to EC	27%	0%	1%	0%	1%	72%			
	EC with Price Variation	94.45	0.00	2.50	0.01	2.49	213.58	297.72	313.03	610.75
	EC with Discount Rate	75.21	0.00	2.06	0.01	2.05	213.54	297.72	292.87	590.59
	Price Variation&Discount Rate	82.23	0.00	2.22	0.01	2.21	213.56	297.72	300.22	597.94
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
W_alu_1	EC	59.83	0.00	4.23	0.02	4.09	21.26	1347.00	89.43	1436.43
	Impact categories contribution to EC	67%	0%	5%	0%	5%	24%			

	EC with Price Variation	92.71	0.00	6.53	0.04	6.41	33.14	1347.00	138.83	1485.83
	EC with Discount Rate	47.95	0.00	3.38	0.02	3.24	16.84	1347.00	71.42	1418.42
	Price Variation&Discount Rate	65.68	0.00	4.65	0.02	4.52	23.43	1347.00	98.29	1445.29
W_alu_2	EC	90.12	0.00	4.99	0.03	4.05	25.95	3841.45	125.14	3966.59
	Impact categories contribution to EC	72%	0%	4%	0%	3%	21%			
	EC with Price Variation	110.59	0.00	6.13	0.04	5.31	35.89	3841.45	157.96	3999.41
	EC with Discount Rate	82.85	0.00	4.57	0.03	3.59	22.26	3841.45	113.29	3954.74
	Price Variation&Discount Rate	93.78	0.00	5.20	0.03	4.27	27.76	3841.45	131.05	3972.50
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
W_plas_1	EC	64.16	0.00	4.07	0.02	4.10	22.79	573.38	95.15	668.53
	Impact categories contribution to EC	67%	0%	4%	0%	4%	24%			
	EC with Price Variation	109.15	0.00	6.60	0.04	6.64	36.56	573.38	158.99	732.37
	EC with Discount Rate	47.82	0.00	3.14	0.02	3.16	17.67	573.38	71.81	645.19
	Price Variation&Discount Rate	72.29	0.00	4.53	0.02	4.57	25.31	573.38	106.72	680.10

W_plas_2	EC	116.12	0.00	4.07	0.03	4.12	35.15	1088.92	159.49	1248.41
	Impact categories contribution to EC	73%	0%	3%	0%	3%	22%			
	EC with Price Variation	209.20	0.00	6.64	0.06	6.71	56.40	1088.92	279.00	1367.92
	EC with Discount Rate	82.93	0.00	3.12	0.02	3.16	27.26	1088.92	116.50	1205.42
	Price Variation&Discount Rate	132.78	0.00	4.54	0.04	4.59	39.03	1088.92	180.98	1269.90
Bauteil-name	**Calculation case**	**GWP** €/kg CO_2	**ODP** €/R11	**AP** €/SO2	**EP** €/PO4	**POCP** €/Ethen	**ADPE** €/Sb	**LCC** €/m2	**EC** €/m2	**Total Price** €/m2
W_wood_1	EC	53.54	0.00	3.91	0.02	4.26	20.14	674.91	81.87	756.78
	Impact categories contribution to EC	65%	0%	5%	0%	5%	25%			
	EC with Price Variation	92.68	0.00	6.33	0.04	6.89	32.31	674.91	138.25	813.16
	EC with Discount Rate	39.40	0.00	3.01	0.01	3.29	15.62	674.91	61.33	736.24
	Price Variation&Discount Rate	60.59	0.00	4.35	0.02	4.74	22.36	674.91	92.07	766.98
W_wood_2	EC	52.38	0.00	3.09	0.02	5.06	19.24	1384.06	79.79	1463.85
	Impact categories contribution to EC	66%	0%	4%	0%	6%	24%			
	EC with Price Variation	110.41	0.00	5.06	0.04	8.20	30.87	1384.06	154.58	1538.64

	EC with Discount Rate	32.42	0.00	2.37	0.02	3.90	14.92	1384.06	53.62	1437.68
	Price Variation&Discount Rate	62.58	0.00	3.45	0.02	5.63	21.36	1384.06	93.05	1477.11
W_wood_3	EC	55.43	0.00	4.49	0.04	4.40	21.43	640.55	85.78	726.33
	Impact categories contribution to EC	65%	0%	5%	0%	5%	25%			
	EC with Price Variation	98.19	0.00	7.23	0.06	7.09	32.16	640.55	144.72	785.27
	EC with Discount Rate	40.16	0.00	3.48	0.03	3.40	17.45	640.55	64.51	705.06
	Price Variation&Discount Rate	63.09	0.00	4.99	0.04	4.89	23.39	640.55	96.40	736.95
W_wood_4	EC	80.85	0.00	4.61	0.04	8.24	24.46	1352.05	118.21	1470.26
	Impact categories contribution to EC	68%	0%	4%	0%	7%	21%			
	EC with Price Variation	179.88	0.00	7.52	0.07	13.34	37.02	1352.05	237.84	1589.89
	EC with Discount Rate	47.19	0.00	3.54	0.03	6.36	19.80	1352.05	76.91	1428.96
	Price Variation&Discount Rate	98.17	0.00	5.14	0.05	9.17	26.76	1352.05	139.29	1491.34