Towards a feasible business case for circular real estate development

Developing a feasible business case to achieve a positive investment decision for a circular logistics development.

Stijn Franke
Delft University of technology – Construction management and Engineering

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by

S. (Stijn) Franke

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Student number:	5421837
Chair:	Ad Straub
Main supervisor:	Vincent Gruis
Secondary supervisor:	Quirien Reijtenbagh
Company supervisor:	Martijn Hordijk
Faculty:	Faculty of civil Engineering and Geosciences
Department:	Construction Management and Engineering

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TU Delft

Preface

With gratitude and enthusiasm, I embark on this academic exploration, a journey born from an eager desire to connect my passion for real estate and sustainability. The seeds of this research were planted when the notion of contributing to real estate development while incorporating sustainability aspects took root in my academic aspirations. Motivated by this vision, I earnestly sought a research avenue that would allow me to delve into the intricate interplay between real estate investing and circular practices. It is with this purpose that I arrived at the research title: "Towards a Feasible Business Case for Circular Real Estate Development – Developing a feasible business case to achieve a positive investment decision for a circular logistics development."

Throughout these pages, I invite you to join me in navigating the nuanced landscape where sustainable principles intersect with the dynamic world of real estate investment. This thesis reflects not just an academic pursuit but a commitment to contributing meaningful insights to the ongoing dialogue on the feasibility of circular real estate development.

Foremost, I extend heartfelt thanks to my unwavering pillars of support – my parents and my girlfriend – for their enduring encouragement, understanding, and belief in my academic pursuits. I am indebted to Martijn Hordijk, my esteemed company supervisor, whose guidance and expertise have been instrumental in shaping the trajectory of this research. His insightful perspectives and unwavering support have enriched my understanding of real-world applications within the realm of real estate.

A special acknowledgment goes to my thesis committee members, Quirien Reijtenbagh, Vincent Gruis, and Ad Straub, whose invaluable insights and critical feedback have steered this thesis towards academic rigor and relevance. Their expertise and mentorship have been pivotal in refining my approach and framing my research within the broader academic discourse.

Thank you for being a part of this journey.

Stijn Franke
Delft, November 2023

Executive summary

The concept of circular economy, emphasizing sustainability and waste reduction, has garnered substantial attention in recent years, driven by concerns about climate change, resource depletion, and urbanization. In contrast to the traditional linear economy, the circular economy focuses on recycling resources and products, fostering a sustainable integration of economic and environmental health. The Dutch government, in response to the challenges posed by the linear economy, set ambitious targets for a fully circular economy by 2050 for the five biggest industries in the Dutch economy. One of these industries is the built environment, a significant contributor to resource consumption and waste.

This thesis specifically targets the real estate sector within the built environment due to its distinctive features and enduring impact, making it pivotal in promoting the principles of circularity. Despite the environmental benefits of circular real estate development, it faces challenges, particularly in financial feasibility. Circular construction methods are often more costly, making it difficult for real estate investors to justify investments solely from a financial standpoint. This study focusses on private equity real estate (PERE) investors. PERE investors, invest capital through various funds with different return and risk characteristics. Furthermore, they are the manager and developer of the real estate after investment and are referred to in this research as real estate investors. Figure i shows how the investor, PERE investor and the investment fund are related. This designation was further utilized in this study.

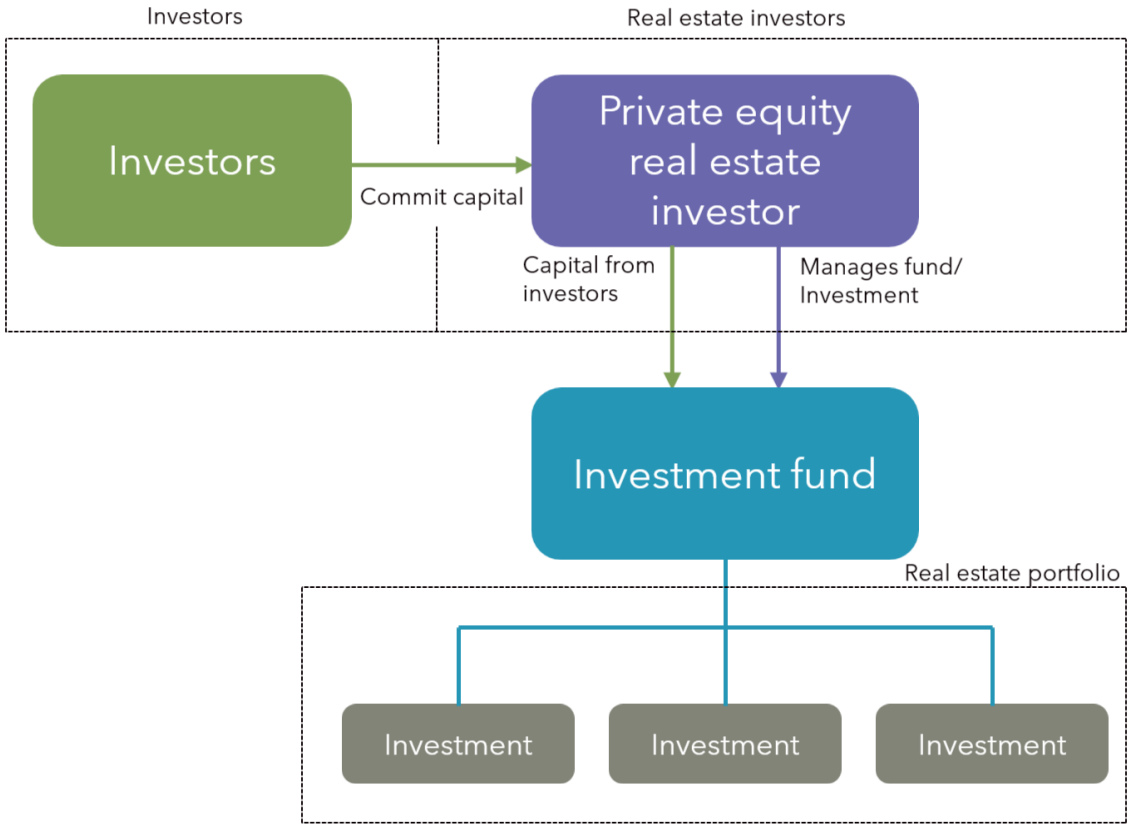

Figure i – Schematic overview relation conditions, factors, business case, and investment decision for circular real estate development.

Despite a surge in circular development methods, the link between circularity and financial aspects remains underexplored. Current challenges include increased costs and construction timelines for circular building materials, making financial justification difficult. Short holding periods and a focus on initial costs by real estate investors pose additional barriers to realizing the extended financial benefits of circular practices. While circular real estate offers environmental and economic advantages, integrating these benefits into the business case requires addressing the conditions associated with short-term financial considerations. Closing the knowledge gap in literature is crucial for guiding real estate investors in making informed decisions that prioritize long-term sustainability over immediate costs. This research therefore aims to answer the following research question:

Under what conditions is there a feasible business case for real estate investors to make a positive investment decision on circular real estate development?

The study focused on one PERE investor operating in the Dutch market, specifically in the logistics building type. The research delves into the initiation, feasibility, and commitment phases of real estate investment, where critical decisions are made, and the business case takes shape. While the study acknowledges the importance of circular construction, it maintains an overall perspective, concentrating on principles rather than specific construction details. The primary objective was to identify conditions that enable real estate investors to invest in circular real estate development, mitigating associated risks and justifying financial decisions. By integrating financial benefits into the business case, this research seeks to empower.

The literature review has provided a theoretical framework essential for this study's objective. It examined the current process of an investment decision in real estate. Where it found that the current investment decision is taken during the Initiation, feasibility, and commitment phase. While the essence of an investment decision lies on the risk and return perspective of the investor. The study delved deeper into the benefits of circular real estate, revealing its significant benefits on environmental, social, and financial levels. Environmentally, circular real estate demonstrated substantial value by reducing greenhouse gas emissions, natural resource consumption, construction and demolition waste, and depletion of virgin material. Furthermore, showing social value through social equity, social welfare, and community development. Financially, the research highlighted rent and sales premiums linked to green buildings. Additionally, it identified potential value in the residual products derived from the circular materials utilized in construction. The final part of the literature review investigated what conditions and factors result in a positive business case. These six identified conditions stem from an analysis of the literature review, informal conversations with a construction and development director from a REPE investor and the review of approved real estate investment decisions from an REPE investor operating in the Dutch market. It found that the following six conditions are paramount in every real estate development: cost, returns, timeline, market development, sustainability, and strategic portfolio management.

In this study, the methodology action research was utilized. This method merges theoretical insights with practical application, to achieve a conclusion on the research question. The research question was addressed through an iterative process comprising two cycles of plan-act-observe-reflect. In the initial cycle, a single focus group discussion was conducted with practitioners from a PERE investor. This discussion was used to explore challenges and considerations in the business case for circular real estate development. The insights gained from this discussion informed the second cycle, where a feasible business case for a case study was formulated and subsequently presented to an investment fund. The study utilized

qualitative data analysis, employing a blended approach, which consist of a combination of deductive and inductive coding. The data analysis started with pre-determined codes (deductive), allowing the coding to have theoretical relevance. The inductive coding emerged from the data and gives nuance to the coding frame. The blended approach was used to analyse the transcribed text files obtained during data collection.

The case study used during the discussion session and presentation, consisted of a circular logistic development opportunity, and involves two vacant buildings that are connect. The buildings are situated in a logistics agro-food production park owned by a Dutch PERE investor. The real estate investor, operating through a core/core-plus fund, owns the land through leasehold interest. The investment fund, classified as low-risk and low-return, focuses on income generation, maintaining a diversified real estate portfolio with a significant logistics sector emphasis.

The first cycle delved into circular real estate design strategies to plan for the single focus group discussion, focusing on the integration of circular principles within building design. This study merged various existing circularity models, to refine its focus on four primary strategies: design-for-reuse (Reusable) [1], design with reused and recycled materials (reuse) [2], design with biobased materials (regenerate) [3], and design with minimal material use (refuse) [4]. Each strategy addresses specific aspects of circularity, aiming to minimize waste, preserve resources, and extend the lifecycle of buildings. The single group discussion session with the practitioners showed several challenges and considerations crucial to the adoption of circular real estate practices. Cost associated with circular developments emerged as a significant hurdle, particularly in the context of increased labour expenses associated with strategies like Reuse and Reusable. The technical complexities of implementing circular strategies, such as material degradation and outdated finishing, further compounded the challenges. The market's development became a focal point, with participants anticipating substantial changes driven by AI and technological advancements. While sustainable building practices are gaining traction, tenants' willingness to pay a premium for circular logistics buildings remains - according to the participants - a challenge. Regulatory shifts, especially concerning CO^2 taxation, are anticipated, adding complexity to the business landscape.

The participants highlighted that the financial feasibility of circular construction lags traditional models due to challenges in higher costs, longer construction timelines, and tenant expectations. A notable discussion that arose during the focus group highlighted the significance of investor appetite as a crucial condition, particularly in the face of challenges associated with circular real estate. Despite these challenges, there's a shared anticipation among the participants that the circular logistics development landscape will evolve. They are expecting market demands to align with sustainable practices and as the availability of materials decreases, circular construction could become more financially feasible.

The second cycle of the results focuses on the business case for circular real estate development. The case study that was selected was a single circular logistic development in the Dutch market. The results compared the business case of a traditional development with a circular development opportunity for this case study, aiming to assess the financial feasibility and garner insights from an investment fund. The business case for the circular development mirrored the underwritings of the traditional development. Although, the circular development differed in financial assumptions, including a 15% increase in hard costs due to the challenges associated with circular construction, which derived from the discussion session. Moreover, there were variations in the estimated rent value (ERV) compared to the traditional development.

Hence, sensitivity analyses and scenario evaluations were conducted on the ERV to understand the impact of these assumptions on returns. This analysis showed that an ERV increase of 8-10% would result in similar returns as opposed to the traditional development.

The circular development's business case was presented to an investment fund, sparking discussions on costs, returns, investor appetite, strategic portfolio management and market development. The fund encounters challenges justifying a 15% increase in development costs amid concerns about rising interest rates and questions about potential returns in the logistics sector. Although, the fund saw the circular logistic development as a future prospect due to current market conditions, high interest rates, and costs. They highlight the increasing attractiveness of material reuse due to government regulations and potential subsidies as remedies for an unfeasible business case. The investment fund being classified as an income fund with a low-risk profile, prioritizes high returns and shorter holding periods. The combination of income orientation, lower returns in circular development, and higher capital expenditure makes it challenging to view this circular logistics development positively.

Given these findings the study found a combination of conditions shaping the feasibility of a business case for circular logistics development. A significant finding from the results is that, in addition to the original six identified conditions, three more conditions—investor appetite, tenant considerations, and legislation—emerge as critical influencers. This insight, emphasized in both the presentation and focus group discussion, highlights the interconnected role of these three conditions with the previously acknowledged six in shaping the overall investment decision. In total there is a complex interplay among nine critical conditions that are of influence on the business case: cost, returns, timeline, market development, sustainability, strategic portfolio management, investor appetite, regulation, and tenant considerations.

Additionally, the results suggested that conditions do not hold equal influence, particularly in the context of circular logistics development. The findings highlighted those specific conditions like cost, returns, investor appetite, strategic portfolio management, and market development carry more weight in shaping decisions within this specific type of development. This distinction was particularly evident during the investment committee meeting, where the investment fund extensively discussed these influential conditions. This is further shown in the figure below, where the influential conditions are marked in green.

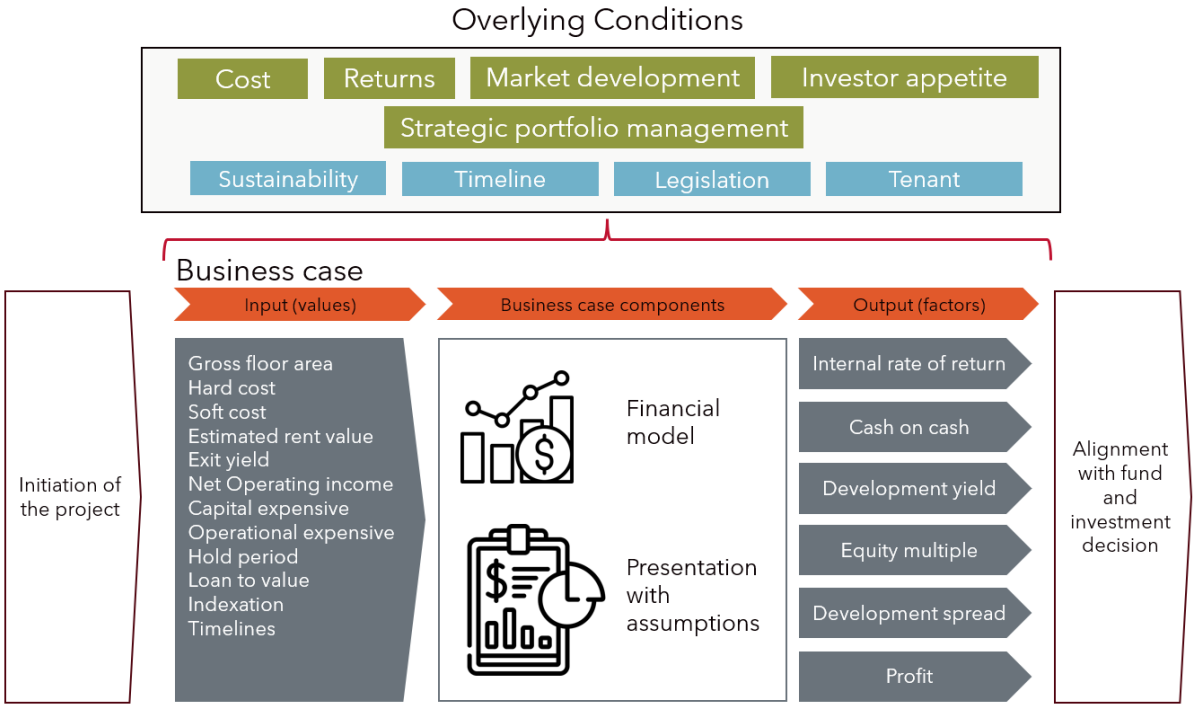

Figure ii – Schematic overview relation conditions, factors, business case, and investment decision for circular real estate development.

The study focussed on determining the conditions for a feasible business case for real estate investors to make a positive investment decision on circular real estate development. This research aimed to address this central inquiry by focusing specifically on the logistics sector. The results, drawn from a specific industry focus, cautioned against generalizing findings to other real estate sectors, such as residential, retail, and office. Despite sector-specific variations, the identified pivotal conditions—cost, returns, investor appetite, strategic portfolio management, and market development—emerged as universally significant. The generalizability of these conditions was further supported by the broad perspective of the investment fund, extending beyond logistics and highlighting their relevance across diverse real estate sectors. The study's findings, therefore, underscore the transferability of identified conditions and their applicability in shaping investment decisions throughout the broader real estate industry.

In conclusion, the study identified nine interconnected conditions that significantly influence the feasibility of a business case for circular real estate development: cost, returns, timeline, market development, sustainability, strategic portfolio management, investor appetite, regulation, and tenant considerations. These conditions exhibit complex relationships and varying levels of importance. Some conditions exert more influence on the business case, while others, in addition to impacting the business case, influence alignment with the investment fund decision. The results highlighted the unique aspects and relationships of each condition, emphasizing their collective role in guiding investment decisions. Notably, certain conditions gained increased importance in circular real estate developments compared to traditional ones, with cost, returns, investor appetite, market development, and strategic portfolio management emerging as crucial factors shaping investment decisions in circular real estate development. Therefore, a feasible business case for positive investment decisions in circular real estate development is contingent on the harmonious interplay of these conditions:

- **Cost vs Returns:** Achieving a feasible business case for circular development is contingent on finding the right balance between minimizing costs and maximizing returns. Despite the anticipated increase in investment costs associated with circular

construction, maintaining a strong connection between costs and returns is essential to ensure consistent profitability compared to traditional alternatives.

- **Investor Appetite:** Securing an investor willing to accept a slightly lower profit, despite higher initial costs, is crucial for a positive investment decision. Aligning investor expectations with the project's long-term potential through circular development fosters mutually beneficial partnerships and plays a pivotal role in shaping positive investment decisions.
- **Strategic Portfolio Management:** The seamless alignment of circular development with the existing portfolio of the investment fund is critical. Thoroughly assessing the fund's portfolio diversity ensures the integration of circular projects, harmonizing effectively with the broader investment strategy and goals of the fund.
- **Market Development:** The investor's evaluation of risk and return heavily influences the investment decision. Understanding prevailing market conditions and identifying trends are pivotal in determining the feasibility of a positive investment decision. Uncertainties or risks within the current market context, especially related to circular development opportunities, can impede the ability to make a positive investment decision.

Following the findings of this research, future research can explore diverse investment funds' responses to circular development, delving beyond the logistics sector to uncover insights in residential and office sectors. Secondly, a comprehensive analysis of the dynamics behind an investment fund in real estate development can be investigated. Thirdly, a detailed investigation into the benefits of circular construction, and a precise study on the specific cost increments linked to circular construction could significantly enhance our understanding of sustainable real estate investment.

Practical recommendations include the creation of a sustainable impact fund that only invests capital from sustainable institutional investor. Where lower returns are expected (and accepted) for higher level of sustainability and circularity in buildings. Finally, the study suggests that since there are currently sufficient materials available for new developments, it may not be logical to opt for a circular design methodology; however, regulations could be implemented to mandate the reuse of a specific number of materials for each real estate development.

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List of abbreviations

PERE	Private equity real estate investor
ERV	Estimated rent value
NOI	Net operating income
LFA	Lettable floor area
GBA	Gross building area
DCF	Discounted cash flow
DMF	Development management fee
CoC	Cash on Cash
IRR	Internal rate of return
EM	Equity multiple
LTC	Loan to cost
BREEAM	Building Research Establishment's Environmental Assessment Method
LEED	Leadership in Energy and Environmental Design

1

Introduction

This first chapter starts with the background for the research, after which it precisely defines the core problem, focusing the study's objectives. The chapter then elaborates on the relevance of the research (Section 1.3), underlining its impact on academia, industry, and society. Section 1.4 introduces the key research questions, guiding the inquiry. The research scope and objective are outlined in section 1.5 and 1.6. In Section 1.7, the research design is explained, detailing the methodologies employed. Finally, Section 1.8 provides an overview of the thesis structure, providing readers a glimpse into the chapters that follow.

1.1 Background

The circular economy has gained attention from academics, policymakers, and practitioners in the last decade. Indicated by the rapid number of articles that have been published about the concept in the mid-2010s and the many consultancy reports that have emerged about the circular economy in this stage (Geissdoerfer, Savaget, Bocken, & Hultink, 2017; Kirchherr, Reike, & Hekkert, 2017). Many influences have resulted in adapting and implementing circular strategies, such as the influence of climate change, resource depletion and urbanization (Zvirgzdins, Plotka, & Geipele, 2019). For industries, the circular economy conceptualises the link between economic and environmental health as a sustainable integration. In addition, circular relates to two descriptive meanings: circular meaning circle, which relates to the idea of recycling resources/products, and the second meaning relates to an economy that has no negative effect on the environment or in a better sense, even tries to restore any original damage, while during the production life-cycle, no additional damage is done (Murray, Skene, & Haynes, 2017).

The circular economy contrasts with the current linear economy of take-make-dispose (Geisendorf & Pietrulla, 2018). In this system, resources are extracted, transformed into products, used, and then ultimately discarded as waste. It is a linear flow where resources are consumed without considering their long-term sustainability or environmental impact. The circular economy is more a cynical flow model that conceptualizes a loop economy to prevent waste and promotes research efficiency, as shown in Figure 1 (Geissdoerfer et al., 2017; Korhonen, Honkasalo, & Seppälä, 2018).

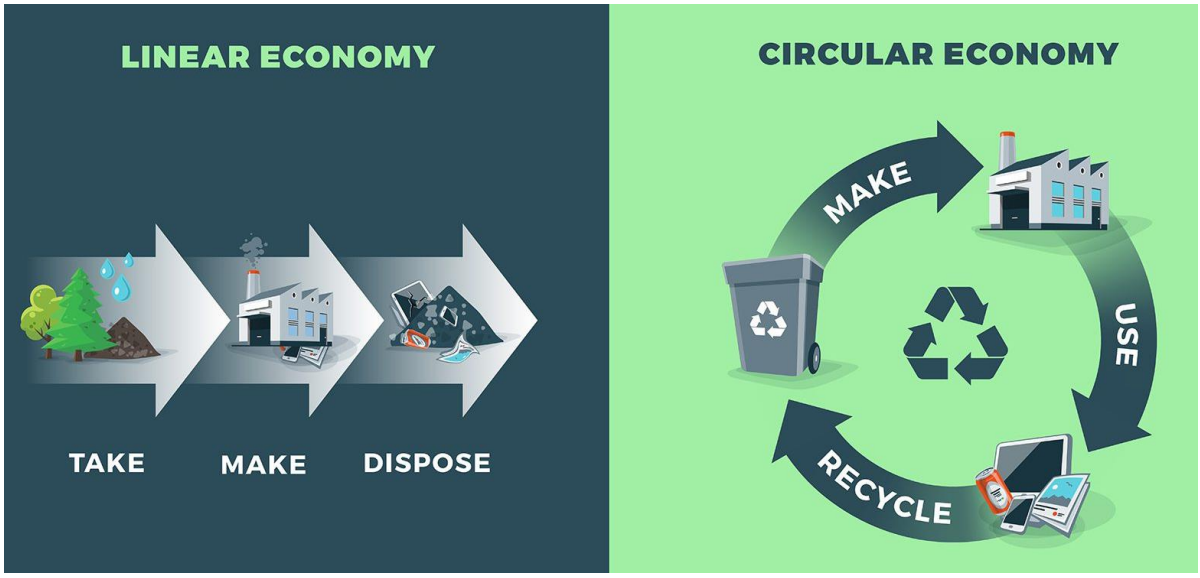

Figure 1 - Linear economy vs circular economy (Instarmac, 2018).

Currently, the linear economy uses large quantities of available resources and fossil energy. In combination with the accelerated economic development, resources and fossil energy is generated into large streams of waste (Neves & Marques, 2022). These outcomes have led the Dutch government to respond, and in 2016 the Dutch Administration outlined how the Dutch economy can change to a sustainable, fully circular economy by 2050. To achieve this goal, several agreements have been implemented, and in January 2017, the Dutch government signed the Raw Materials Agreement (Dutch: Grondstoffenakkoord) with 180 parties from the government, businesses, trade unions and environmental organisations. An intermediate goal is set in 2030: using 50% fewer primary raw materials in the Netherlands (minerals, metals and fossils), and the final goal of a fully sustainable, circular economy in 2050 (Ministerie van Infrastructuur en Waterstaat, 2023).

To enhance the transition to a circular economy, the Dutch government formulated transition agendas for the five most important industries for the Dutch economy. One of these industries is the built environment that accounts for around 50% of raw material consumption, 40% of the total energy demand and 30% of the water demand in the Netherlands (Ministerie van Infrastructuur en Waterstaat, 2022). In 2020, the Netherlands accounted for 65,4% of the total waste produced as construction and demolition waste (Eurostat, 2020). The average in Europe is 36% of the total waste produced, it is the heaviest waste stream the European Union produces (Ghaffar, Burman, & Braimah, 2020; Ginga, Ongpeng, & Daly, 2020). Moreover, this has increased attention towards the change from a linear economy to a circular one in the built environment showing that the potential environmental benefits are enormous. These previous mentioned numbers are only about waste, energy and water but the associated negative environmental effects are much more comprehensive: resource misallocation, greenhouse gas emissions, urbanization, pollution and many more (Mhatre, Gedam, Unnikrishnan, & Verma, 2021; Zvirgzdins et al., 2019).

1.1.1 Real Estate and Real Estate Investment

Adapting to a circular economy in the built environment remains a challenge due to various reasons. The buildings and building elements have unique characteristics such as high initial investment, long service life, project-specific nature (custom made), and technical degradation that can be irreversible (Ploeger, Prins, Straub, & Van den Brink, 2019). Real estate is a significant

component of the built environment, which encompasses buildings and building elements. It has a vital role to play in advancing the principles of the circular economy.

Incorporating circular strategies in the real estate industry can boost economic growth into the built environment (Munaro, Tavares, & Bragança, 2020). The built environment holds a crucial position in the global economy and offers opportunities for innovation and sustainable growth. The increasing potential in the real estate industry can further boost this potential (Merrild, Jensen & Sommer, 2016). Nevertheless, circular real estate development is currently more expensive than linear construction, which is widely cited in literature (Dwaikat & Ali, 2016). In four Dutch projects investigated by Copper8 (2022) the additional cost for circular real estate development were between 1,7% and 7%. For a real estate investor, this increased in capital requirement results in an increase in risk and impact of the risk (Manganelli, 2015, p. 77). If the increased cost is not reflected in the returns, then there is no feasible business case and thus a negative investment decision for circular real estate development. Figure 2 schematically shows how a traditional real estate development makes profit in comparison to its circular opposite. The circular real estate development has a 7% initial cost increase, in comparison to the traditional development.

Achieving a feasible business case remains paramount; however, it becomes increasingly challenging due to the increased investment cost. Furthermore, other several factors in the current Dutch market play a crucial role in the risk towards the business case. Other factors, such as the nitrogen crisis, increasing interest rates, a congested energy grid, and the high cost of building materials all add to the risk (Van Der Laan, 2023). In addition, the real estate industry is being confronted with the need to make investment decisions based on environmental, social, and governance (ESG) criteria and other regulations. The relatively slow adoption to sustainable investment practices in the real estate sector further amplify these factors (Friede, Busch, & Bassen, 2015).

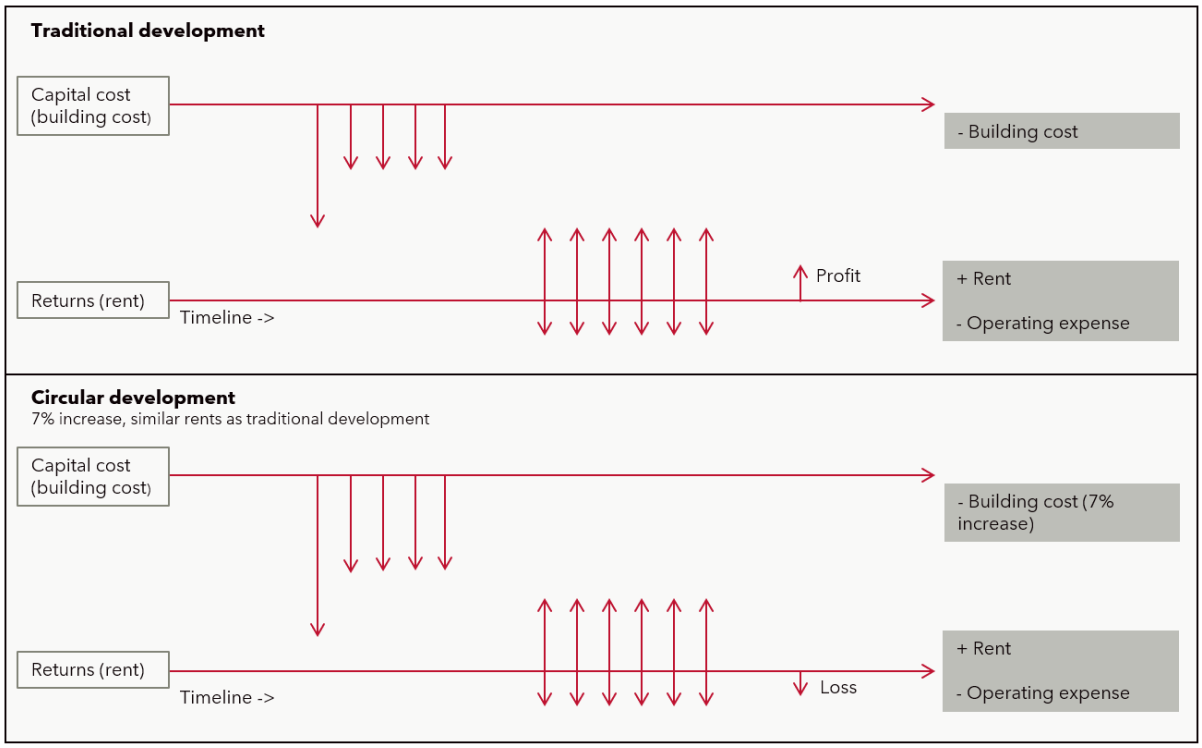

Figure 2 – Figuratively capital balance Traditional real estate development vs Circular real estate development. Capital balance and returns are approximations (own figure).

1.2 Problem statement

As mentioned, the construction industry accounts for one of the most voluminous waste streams in the European Union, which has resulted in increased attention to a circular economy since the beginning of this decade under real estate appraisals and valuations. (Fregonara et al., 2013; Fregonara, Giordano, Ferrando, & Pattono, 2017). Currently, the focus has shifted among real estate development from reducing only energy consumption in the building towards a complete, fully circular sustainable building while looking at the total life cycle (Buyle, Galle, Debacker, & Audenaert, 2019). This increasing demand for sustainability and circularity has led to various methods from academics of how to measure circularity in real estate properties. While there is also a vast amount of knowledge on market values and investments in real estate its connection is not deeply investigated (Mangialardo, Micelli, & Saccani, 2018; Warren-Myers, 2022).

Within the real estate sector selecting sources, opportunities, and methods for increasing the value of the investment object is a crucial factor in making investment decisions within the capital market (Klimczak, 2010). At present, there is limited financial justification for investing in circular real estate developments, particularly when focusing solely on financial outcomes. The production and application of circular building materials have become more cost-intensive and time-consuming. The increased expenses in manufacturing these materials, coupled with the extended construction timelines they necessitate, contribute to the current financial challenges associated with circular real estate projects (Ghaffar et al., 2020; Ginga et al., 2020; Warren-Myers, 2012). Additionally, numerous real estate investors maintain short holding periods, potentially neglecting the extended financial benefits linked to circular practices across the entire life cycle in their business cases. Moreover, conventional real estate investors tend to focus solely on the initial costs in making investment decisions, neglecting other benefits (Fregonara et al., 2017). This financial landscape poses a hurdle for real estate investors, as the immediate financial benefits of circular development may not outweigh the costs, making it a less straightforward financial decision compared to more conventional alternatives. It is therefore cheaper for a real estate investor to leave the building vacant after its end-of-life, and develop on a new greenfield site (Schut, Crielaard, & Mesman, 2016). Although, additional benefits exist with circular real estate development, such as environmental benefits, economic benefits, lower vacancy rates, and potential value from residual materials (Mangialardo et al., 2018; Warren-Myers, 2012; Wuni, 2022; Zijlstra, 2023).

The aforementioned benefits of circular real estate can be incorporated into the business case and have financial benefits for the real estate investor, according to Zijlstra (2023). Although, the combination of a short hold horizon, increased investment costs, limited financial justification, and the relatively long-time horizon and value of materials over 20-50 years is risky. There is a knowledge gap in the combination of circular real estate development and real estate investment decisions in the existing literature. This gap specifically focuses on how to integrate circular real estate development principles' (financial) benefits, into the business case of an investment decisions (Mangialardo et al., 2018). Real estate investors need to understand the risk reduction that comes with incorporating circular principles, outweighing any initial costs, in the long run.

1.3 Research relevance

This sub-section delves into the significance of the study from multiple perspectives. It examines the scientific relevance, practical relevance, and societal relevance of the research. By thoroughly exploring these dimensions, the chapter establishes a strong foundation for understanding the importance and value of the research conducted.

1.3.1 Scientific relevance

Publications and information on the circular economy is increasing every year. Nonetheless, abundant information exists on both the circular economy and real estate investment decisions. Despite this wealth of knowledge, the intricate connection between these two domains has not undergone thorough exploration until now. (Warren-Myers, 2022). The concept of circular real estate holds great importance and warrants further exploration. It is worth noting that the real estate industry, known for its traditional practices, is often resistant or slow to adapt to innovation. Consequently, real estate investors may perceive the adoption of circular practices as risky. The current literature indicates that there is currently a risk and more expensive cost associated with circular construction (Dwaikat & Ali, 2016). But a solution or a way how the (financial) benefits can be factored into a real estate investment so that a viable development is achieved, is not currently in place (Mangialardo et al., 2018)

1.3.2 Practical relevance

Multiple regulations are set in place to speed up the transition towards a circular economy. The Netherlands, as earlier mentioned outlined its goal to achieve a sustainable, fully circular economy by 2050. Moreover, this goal is fully in line with the regulations and rules of the European Union, which are defined in the European Green Deal (European Parliament, 2021). Other rules and regulation that are of relevance of this study is the EU Taxonomy, implemented by the European union to have a common language for sustainable finance (Dennis, 2023). One of the environmental objectives within the EU taxonomy is the transition to a circular economy. In addition, the circular economy has a close relation to ESG goals of the EU. These environmental regulations necessitate companies to transition towards circular and sustainable investments in the real estate sector. However, as outlined in the problem statement, the advantages of circular real estate have not been integrated into real estate investment business cases. This study aims to assist organizations and companies in investing in circular real estate by highlighting its benefits for both the companies and the communities, thereby demonstrating its practical relevance.

1.3.3 Societal relevance

Furthermore, there is a social responsibility for companies to adapt to a circular economy. The circular economy within the real estate industry can enhance the well-being of people today and of future generations (Tapaninaho & Heikkinen, 2022). The reduction of carbon impact on the climate, along with the environmental benefits associated with circularity, are also significant (Wuni, 2022). Although, there is an optimum to meet the social expectations and responsibilities while still making profit, and incorporating these environmental challenges into its business cases (Morea, Fortunati, & Martiniello, 2021).

1.4 Research questions

The following research question is central in this study:

Under what conditions is there a feasible business case for real estate investors to make a positive investment decision on circular real estate development?

To find a result on this research question the following sub-questions are defined:

1. What is the existing investment process currently used by real estate investors to achieve an investment decision?
2. What is the added (financial) value of circular real estate development?
3. What factors and conditions lead to a feasible business case for a real estate development?
4. What are the challenges and considerations in the business case for a circular real estate development?
5. What are the specific responses of real estate investors when presented with a business case for circular real estate development?

1.5 Research scope

The research is performed in collaboration with a private equity real estate investor (PERE). The real estate investor possesses capital across a diverse range of funds, which consist of several institutional vehicles. Using this capital, the PERE investor engages in real estate developments and is the manager during the operating phase. Taking this into account, this study is therefore, written from the perspective of a PERE investor. Figure 3 shows how the investor, PERE investor and the investment fund are related. This designation was further utilized in this study.

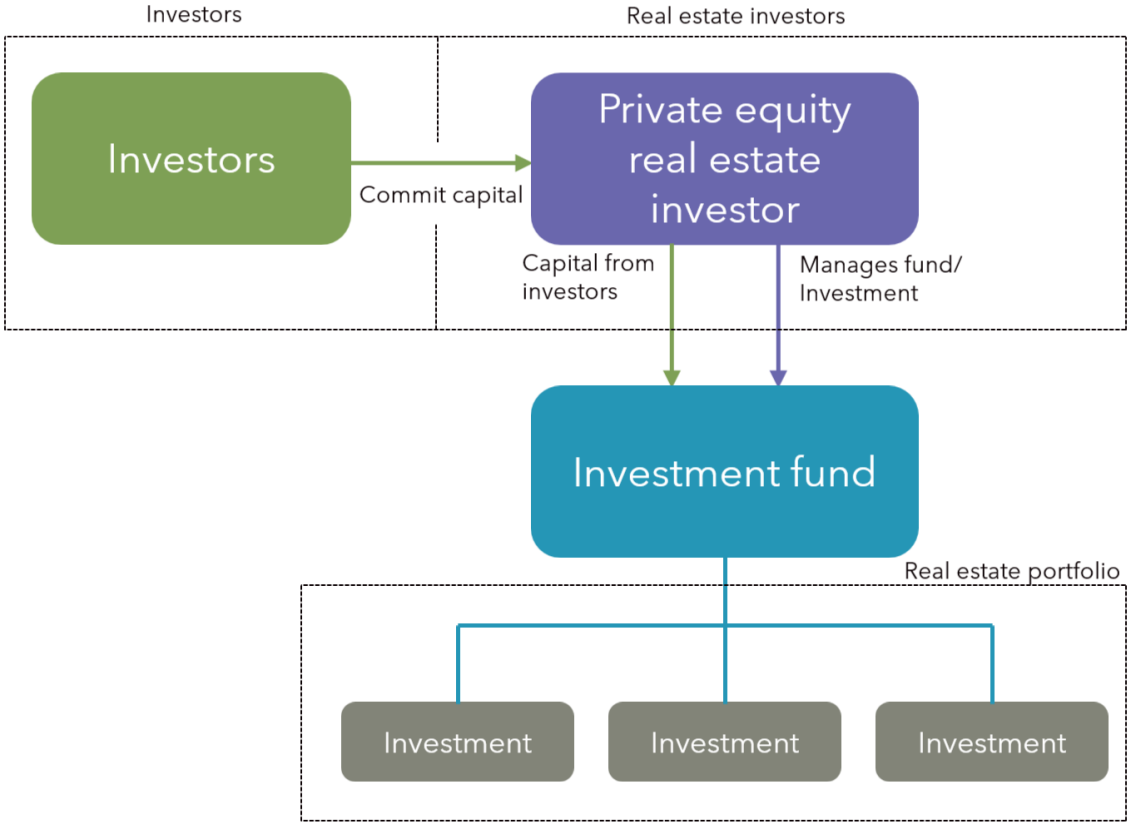

Figure 3 – Relation between investor, PERE investor and Investment fund (adapted from Highground advisors (n.d.); Wall Street Prep (2023b)

The essence of this research lies on a feasible business case for circular real estate development and not circular real estate. It has been decided not to delve too deeply into circular construction, as this would provide a significantly different perspective on the research. It is only touched upon in the theoretical framework.

The PERE investor operates in the Dutch real estate market, which is therefore subject to this thesis. Within the Dutch real estate market, the thesis focusses on a logistics asset type.

The real estate investment and development process is divided into many phases. This research primarily concentrates on the investment decision. During the investment decision, crucial decisions are predominantly made by the real estate investor, laying the foundation for subsequent periods. It is also during the investment decision that the business case most often emerges, on which the essence of this research lies. Although, the construction and management phase are also important for this study. The management phase is only reflected in terms of financial value which is incorporated in the business cases.

1.6 Research objective

The main goal of this research is to find the conditions needed for a real estate investor to invest in circular real estate development, reducing the risk that is currently accounted with applying circular principles. To achieve this objective, it is explored what circular real estate is and how the justification of circular principles can be factored into the current business cases. The objective of this study is therefore: considering (financial) benefits, a feasible business case can be created to support real estate investors to make positive investment decisions. Giving real estate investors a feasible business case for circular real estate development.

1.7 Research design

The research is primarily divided into three parts. The three parts are used to fulfil the objective of this study and answer the sub-questions and research question. A schematic overview of the research design is given in Figure 4. The literature review serves as a theoretical foundation for this study, aiming to explore existing knowledge on the concepts related to the research topic. The primary objective is to identify the current state of knowledge on circular real estate and its (financial) benefits, and real estate investments (process and business cases) to guide the empirical study. Various academic databases, journals, books, and relevant online resources will be extensively reviewed to gather comprehensive and up-to-date information on the subject matter.

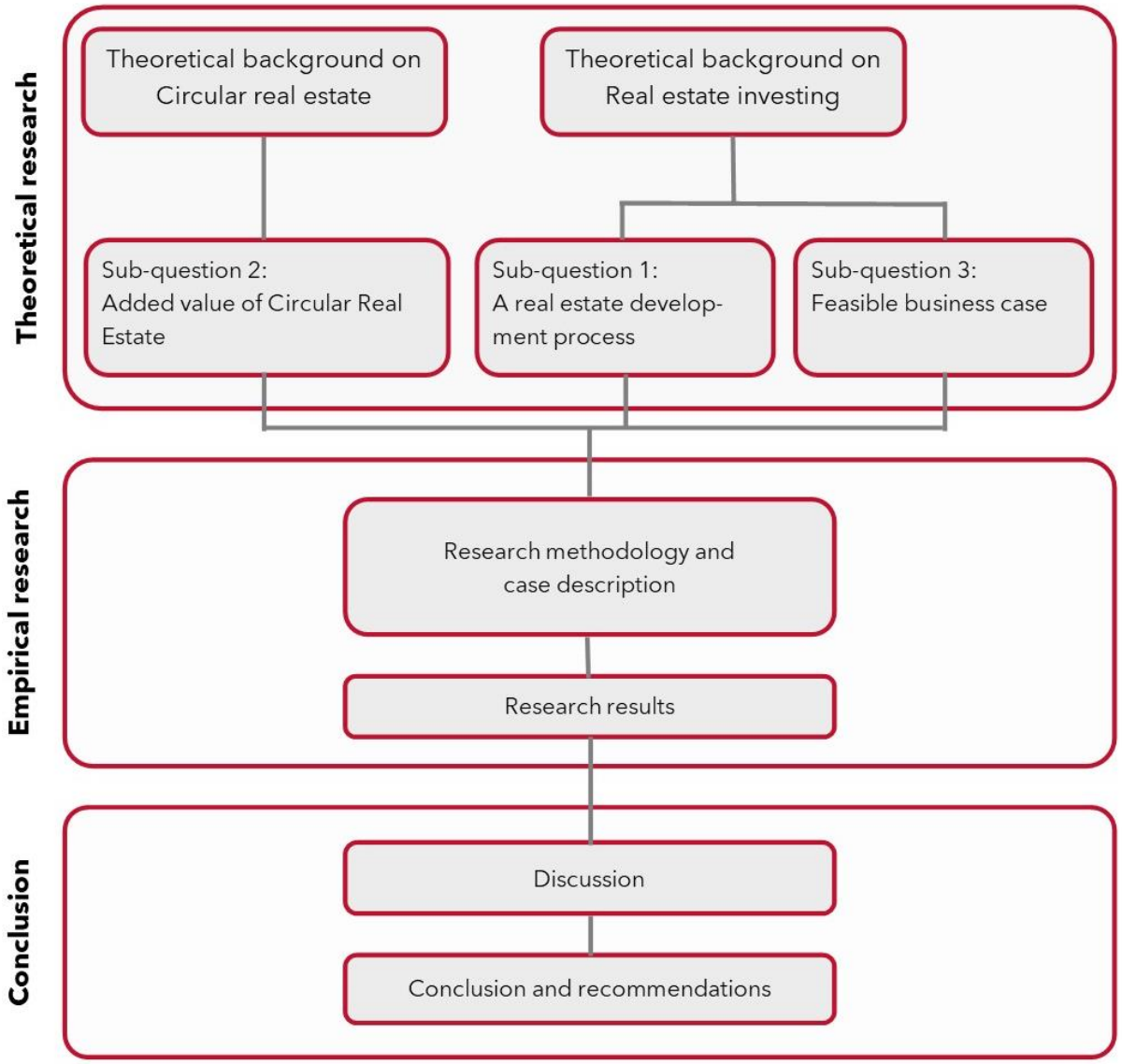

Figure 4 - Research outline (own figure)

The empirical study in combination with action research represents the core of this research. The empirical research involves the collection and analysis of data from direct observations or experience (Emerald Publishing, (n.d.)). During this part sub-question 4 & 5 are answered by means of a qualitative approach. The objective of this part is to identify the challenges and considerations of circular real estate development in relation to the business case and the reaction of the real estate investor towards such a business case. The action research aims to find an answer for sub-question 4 and 5 and is further explained in chapter 6. The action research aims to propose potential solutions based on the findings from the empirical study and existing literature. The closing of the action research will give a solution to the central research question.

1.8 Thesis outline

In the introductory section, the study begins by providing the background of the research, outlining the identified problem, and establishing the significance of the study. The research questions, scope, objectives, and the overall methodology are introduced, setting the stage for the subsequent chapters.

The theoretical framework (Chapter 2) delves into the workings of circular real estate designs and explores the foundational theories underpinning real estate investing, providing the theoretical foundation for the study. Chapter 3 examines the positive real estate investment process, analysing the pivotal decision points within investment and exploring the balance between risks and returns in real estate ventures. Chapter 4 shows the benefits that accompany circular real estate on an added value perspective and a financial perspective. Chapter 5 displays how a business case looks like for a real estate investor and shows what conditions and factors are of importance of this case.

Moving into the research methodology (Chapter 6), the chosen methodology is explained, detailing the methods employed for data collection and analysis. Additionally, a detailed case descriptions is provided, offering context to the subsequent analyses. Chapter 7 presents the results of the study, dissected into two sections. The first part examines the challenges and considerations associated with circular real estate, while the second part focuses on real-life business cases, providing practical insights into circular real estate development.

In Chapter 8, the discussion section critically engages with the research findings. It interprets and analyses the results, highlighting their implications within the context of the study. The limitations of the research are also shortly addressed, providing a transparent view of the study's scope. The concluding chapter (Chapter 9) synthesizes the research findings. It answers the research questions posed at the beginning, providing clear and concise responses. Furthermore, the chapter offers recommendations for future academic research, pointing out potential areas for further exploration. Practical recommendations are also presented, guiding industry professionals based on the study's findings and insights.

In this flowing structure, the thesis unfolds, leading the reader from the theoretical framework to the conclusion, offering a comprehensive exploration of the chosen topic.

2

Theoretical framework

Chapter 2, the theoretical foundation of the study is presented with clarity and depth. The exploration begins by examining circular real estate (Section 2.1). This section delves into the complex models of circular economy and circular real estate design, providing a comprehensive overview of their structures and functions. Following this, the chapter delves into the theoretical backdrop of real estate investing (Section 2.2). It offers a nuanced understanding of the different real estate investors and enriching the reader's comprehension on real estate investment valuations.

2.1 Circular real estate

Real estate refers to tangible assets in the form of physical properties, encompassing buildings, land, underground rights, and air rights above the land (Amadeo, 2022). It is perceived as an item that is challenging to compare with other products due to its sustainability, high cost, and uniqueness (van de Kaa, 2013). It comes in many different shapes and sizes, but the real estate industry works primarily on four different sectors: residential, commercial, industrial, and vacant land as shown in Figure 5.

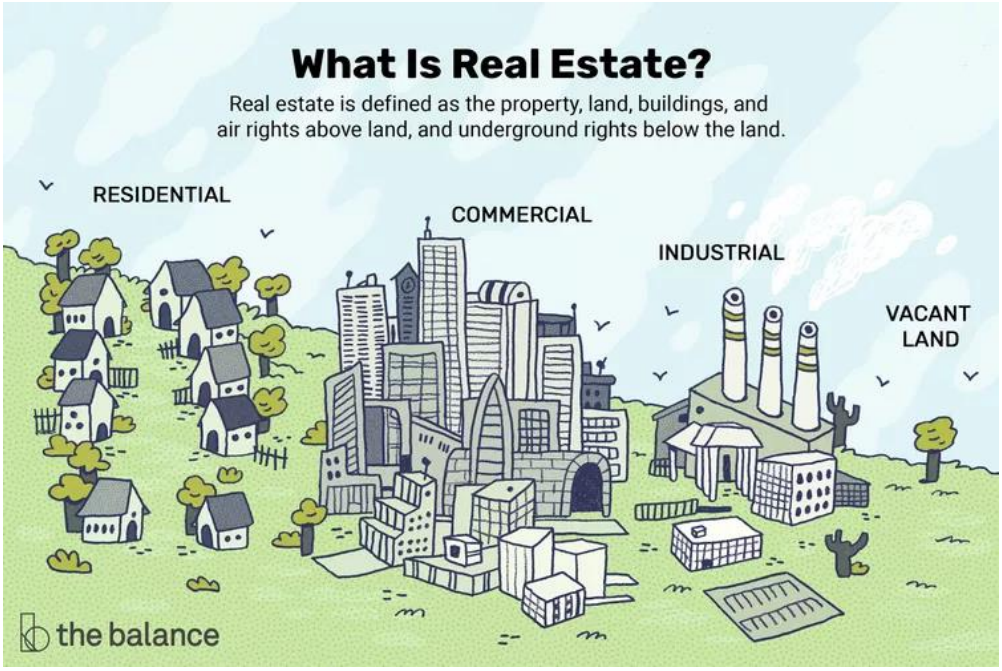

Figure 5 - Real estate sectors (Amadeo, 2022).

Real estate is an enduring asset class, as buildings are designed to have a long physical lifespan. On average, buildings have a technical and functional life span of 50-75 years (Munaro et al., 2020), but they frequently exceed this duration by many years. To further enhance the sustainability and adaptability of buildings, there is a growing focus on incorporating circular design principles. Circular real estate is gaining momentum, aiming to create buildings that are

more adaptable and environmentally friendly. By embracing circularity, buildings can achieve a higher end value by promoting the reuse of materials (European Union, 2022).

2.1.1 Principles of a circular economy

The Ellen MacArthur Foundation (EMF) published a report in 2013, which laid the foundation for the concept of the circular economy and outlined its economic and environmental benefits. The EMF is widely acknowledged as the leading author of the circular economy and is cited frequently in literature (Kirchherr et al., 2017). The Ellen MacArthur Foundation (2013), published a set of principles that represent the circular economy and are more manageable for business.

- Design out waste.
- Build resilience through diversity.
- Rely on energy from renewable sources.
- Think in systems.
- Waste is food (Ellen MacArthur Foundation, 2013)

To visualize the circular economy the EMF illustrated the principles of a restorative circular economy in the butterfly diagram, which is shown in Figure 6. The diagram shows how the technical and biological materials and products should go through the economic system. The materials and products are reused, repaired remanufactured and recycled in the technical cycle and in the biological cycle the materials are regenerated to nature (Bianchini, Rossi, & Pellegrini, 2019).

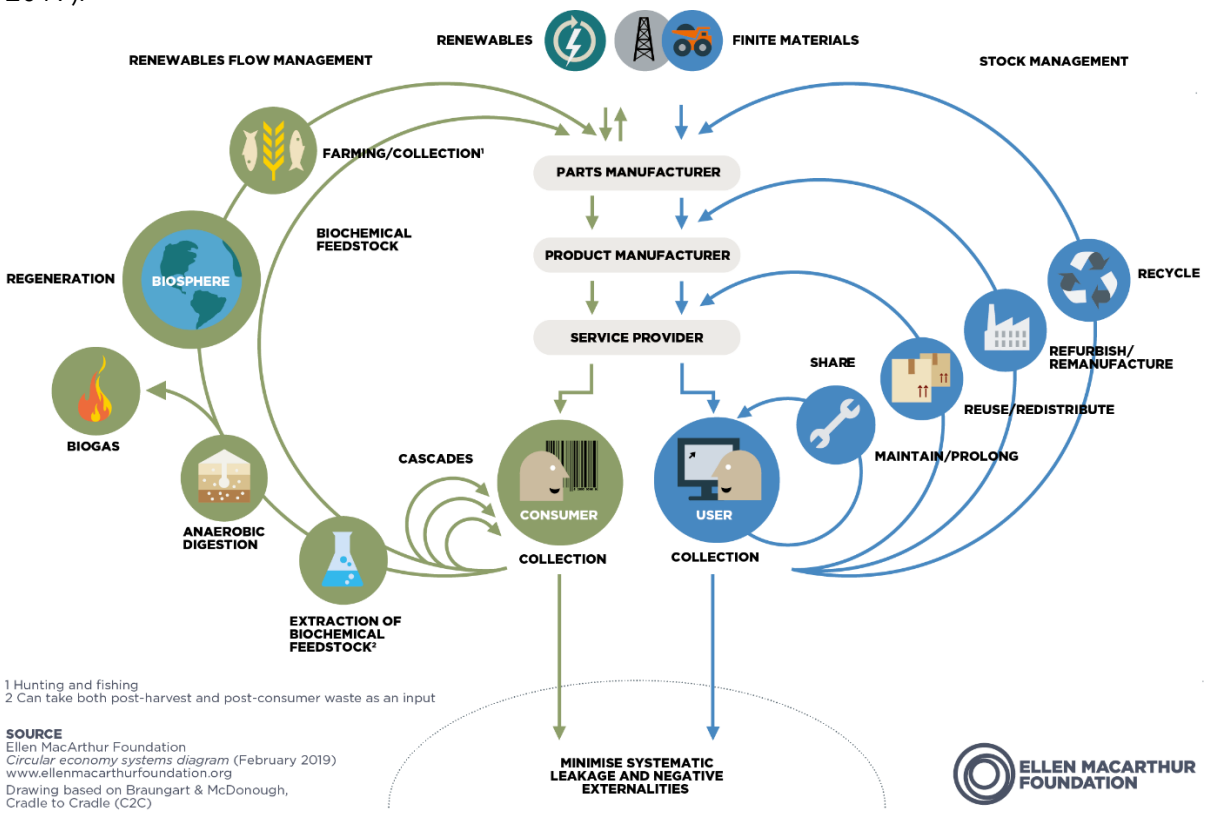

Figure 6 - Circular economy butterfly diagram from (Ellen MacArthur Foundation, 2013).

Building on this diagram, academic literature outlined multiple frameworks often referred to as R-frameworks. The various R-frameworks are viewed as a core principle of the circular economy and show how to arrive at circular strategies (Kirchherr et al., 2017). The R-strategies exemplify approaches that enable reduced resource utilization and decreased material consumption. The butterfly diagram visually illustrates various R-strategies, including Reuse, Remanufacture, and

Recycle. Although different frameworks share common elements, their distinctions primarily lie in the quantity of strategies they put forth. Among these frameworks, the 10R strategy proposed by Potting, Hekkert, Worrell, and Hanemaaijer (2017) is widely regarded within the literature as the most nuanced framework (Kirchherr et al., 2017). The strategies in the framework of Potting et al. (2017) try to maintain the primary function of the product, the 10R framework is shown in Figure 7.

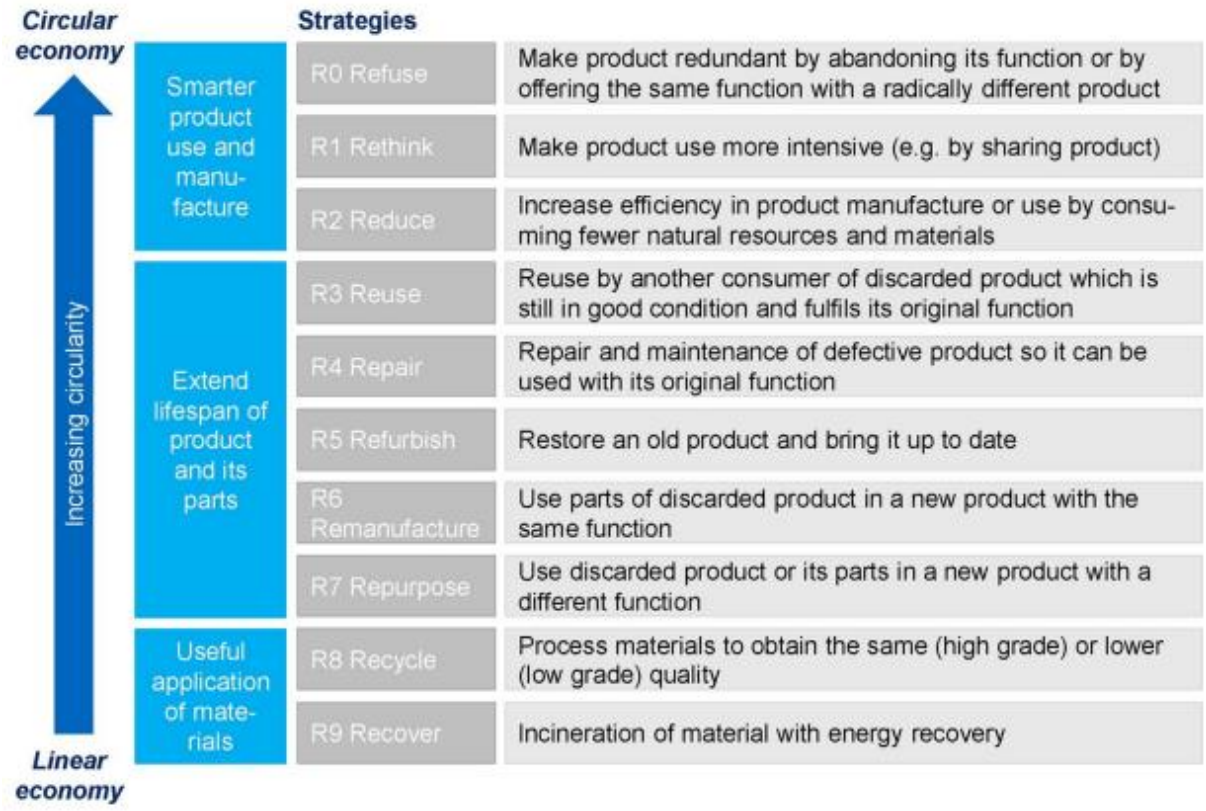

Figure 7 - The 10R-framework from (Potting et al., 2017).

2.1.2 Circular real estate design strategies

Many different definitions and principles exist for the circular economy (Kirchherr et al., 2017). However, the principles outlined above are established at the product and material levels, rather than at the building level. Additionally, within the realm of academic literature, numerous circular strategies are also outlined specifically for building-level implementation. The Transitieagenda Circulaire Bouweconomie adapts the following definition for circular real estate design strategies: "Circular construction means developing, using and reusing buildings, areas and infrastructure, without unnecessarily depleting natural resources, polluting the living environment and damaging ecosystems. Building in a way that makes economic sense and contributes to the well-being of people and animals." (Attia & Al-Obaidy, 2021; Transitieteam Circulaire Bouweconomie, 2018).

While this translation primarily pertains to circular construction, it serves as an apt representation for circular real estate. In addition, Attia and Al-Obaidy (2021) identified four primary design criteria/strategies for circular buildings. The four criteria should function as guidelines and as strategic decisions for circular real estate development or renovation.

1. Carbon footprint of the real estate development. This criterion compromises the embodied and operational carbon emitted during the operation of the real estate for at least 50 years.

2. Reused content and recycled content, showing the number of virgin materials, and the overall duration for which materials remain functional within the building.
3. Disassembly and longevity potential of the building components. Considerations include the timing and method of disassembly, such as the type of connections used during construction.
4. Building design flexibility (adaptability). The flexibility and adaptability of the building over a long period of 50-100 years showing the ability to change function in this time span (Attia & Al-Obaidy, 2021).

Challenges arise in the design of circular buildings due to the distinct lifecycles associated with their various layers. In combination with the above mentioned design criteria a key aspect of circular buildings is the concept of shearing layers. Brand (1995) introduced a framework comprising six layers: site, structure, skin, services, space plane, stuff, which each serve as a unique purpose and possess their own functional lifespan, shown in Figure 8. By employing the Six layers-model, the building can be viewed as a collection of independent objects.

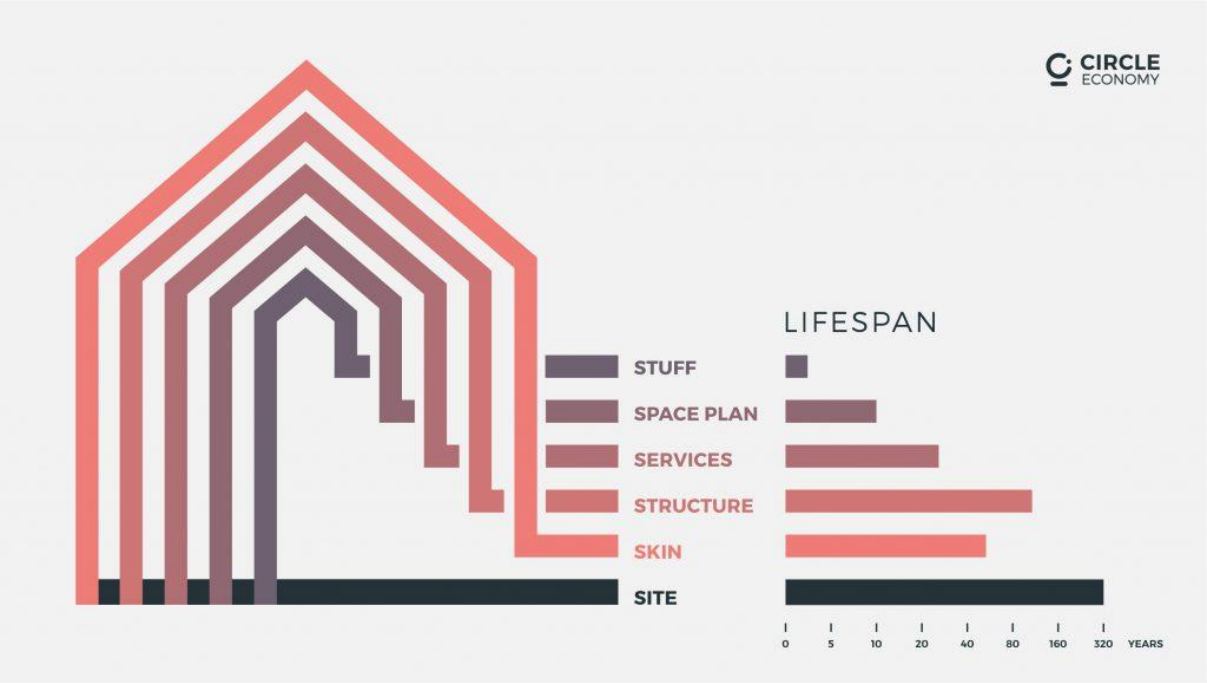

Figure 8 - Technical and functional lifespan of a building from (Circule Economy Foundation, n.d.)

There is a relation between the design strategies, building layers and R-framework for circular real estate design. Both the sharing layers and butterfly diagram are general circular economy principles, architects rely on these concepts due to the lack of understanding how the circular economy can be applied to the building sector. Their mentioned goals often come out to maximise reuse, reduce waste and reduce the environmental impact (Kanters, 2020). Attia and Al-Obaidy (2021) definition of design criteria for the building sector and the building layers come close to circular real estate design criteria, and although the R-framework and butterfly diagram are more related to the product and material level they form a basis for circular real estate design.

2.2 Real estate investing

Within real estate investing there are two primary modes of investing: indirect (securitized or financial) and direct (physical). In a direct investment, investors acquire tangible assets like properties, lands, or buildings. Indirect investment involves purchasing shares of real estate

investment companies, such as private equity and Real Estate Investment Trusts (REITs) (Georgiev, Gupta, & Kunkel, 2003).

Real estate can offer a wide range of services and benefits, serving as residences, workplaces, or industrial spaces. It involves diverse functions, yet the fundamental purpose of investing in real estate lies in its potential for financial growth. Those with the means to invest directly can leverage the asset for capital gain and profit, expanding their financial portfolio. Therefore, the goal of investing in real estate in general terms is twofold:

- A service, the building acts as a service and is used for self-consumption. The building can act as a dwelling or is instrumental to production.
- Flow of future income, the building is seen as an investment and is used to produce a flow of income for the investor (Manganelli, 2015, p. 2).

For both modes of investing the most important criteria for a real estate investor, is increasing the value of the investment object (Klimczak, 2010). Value is created with real estate in broad terms by two ways: revenue resulting from the exploitation of the investment object, and the increase in value from the asset (Manganelli, 2015, p. 2)

2.2.1 Real estate investors.

Multiple actors are involved in real estate investments, according to Manganelli (2015) there are three economic operators in the real estate market: small owner real estate, real estate company, and real estate fund. Although these cover a large part of the operation in the real estate market, this study focusses on private equity real estate (PERE) investors. Aveline or Aveline-Dubach (2017) schematically displayed how capital circulates in real estate investment. As Figure 9 shows institutional investors are a big capital investor in real estate. Institutional investors are the investment managers of a large amount of capital that pension funds, investment funds, and insurers hold (Van Loon & Aalbers, 2017). They perform as well as direct investment as indirect investments.

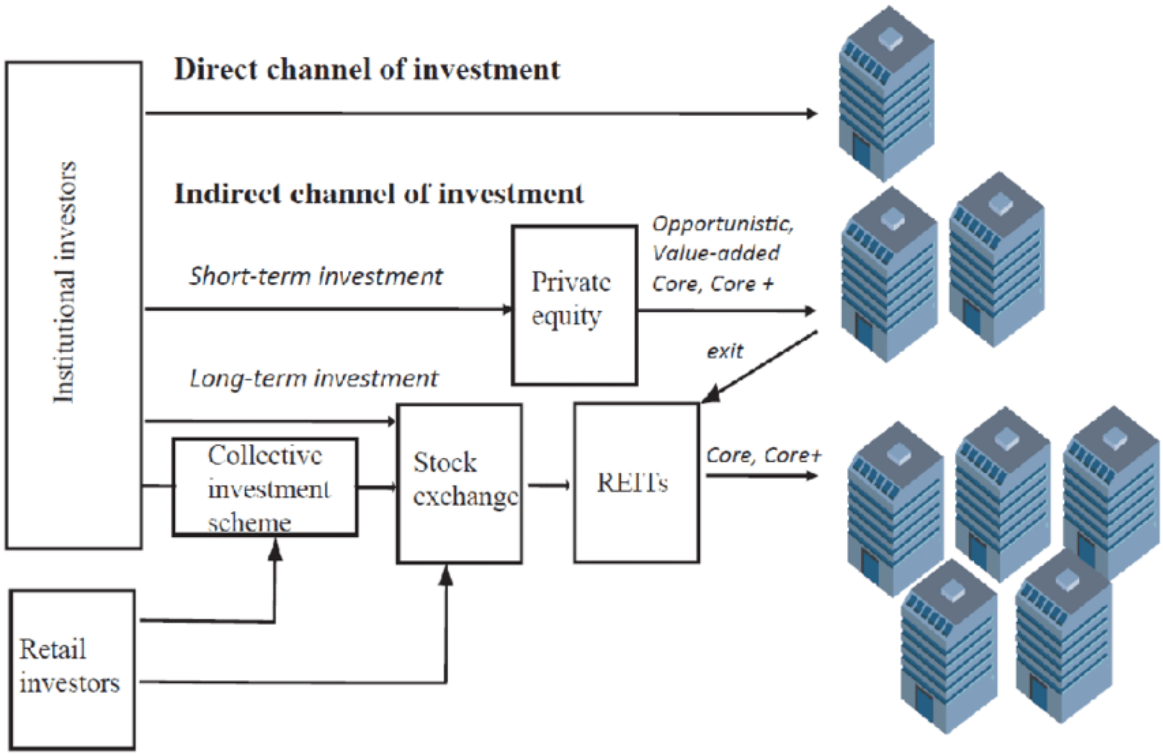

Figure 9 - Circulation of capital in real estate investments from (Aveline or Aveline-Dubach, 2017).

This study focusses on private equity real estate (PERE) investors. Private equity real estate investors invest capital through various funds with different return and risk characteristics. The capital that is invested in private equity investors comes most often through institutional investors although high-net individuals often also invest. The investors in the fund become limited partners of the fund while the private equity firm operates as the general partner and is therefore responsible for the investment and management of the fund (Tomperi, 2010). Although the investor still has significant influence on the investment the fund makes. Figure 10 shows how a PERE investment fund is build up. Additionally, it provides a schematic representation of the capital flow within the structure. The PERE firm acquires fees from managing and developing the real estate, along with carried interest from investments. The investors earn capital interest in the form of generated rent from the real estate investment object.

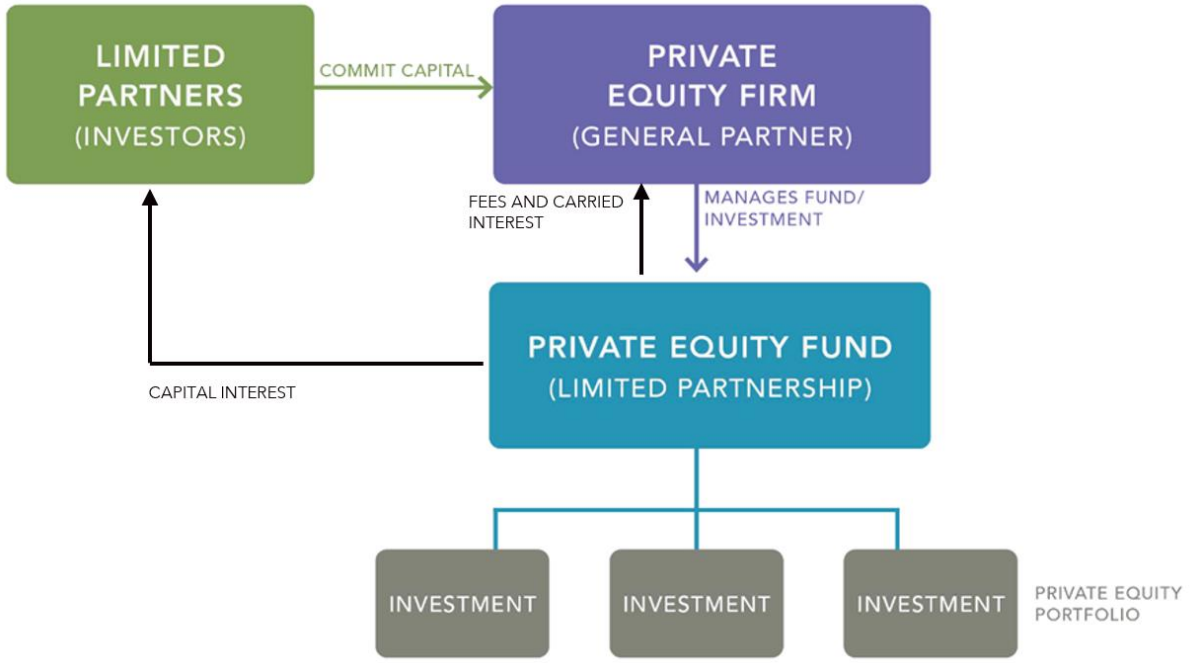

Figure 10 - Structure of private equity real estate investment fund (adapted from Highground advisors (n.d.); Wall Street Prep (2023b)

The PERE firm often has many different investment funds or vehicles. Moreover, this is due to the diverse asset class that is in real estate and the many factors that are associated with the investment, such as the property location, tenancy structure, quality of the building design and construction, level of sustainability, and whether it is an investment into an existing structure or new development. These all add to the risk that is associated with investments in real estate. Further financial risks are the financing structures, the vacancy rates, the length of and the lease structure, and the amount of equity that is associated with the development (Just & Stapenhorst, 2018). The investors want to be compensated for this risk with an expected return. Within the PERE structure the risk and return are positively correlated, which is shown in Figure 11. The funds are in general classified as core, core-plus, value-add, opportunistic.

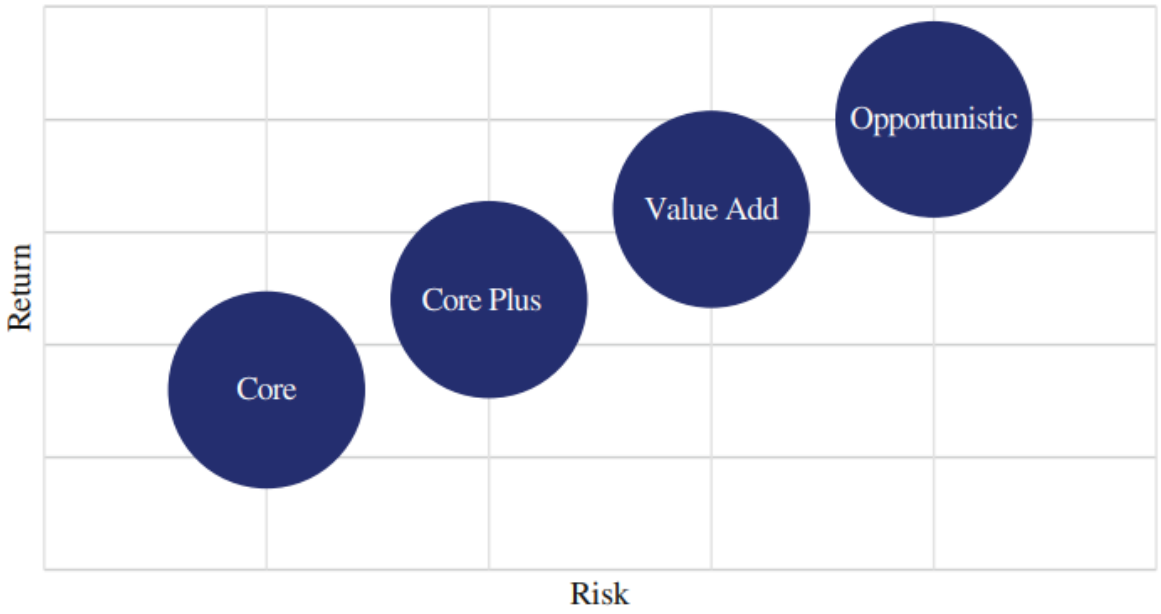

Figure 11 - Correlation risk and return for REPE investment funds, from (Just & Stapenhorst, 2018).

2.2.1 Real estate investment valuations

To assess the feasibility of a real estate investment, various valuation techniques are employed. These methods typically involve evaluating the costs and benefits associated with the development. However, it's important to note that the costs linked to the development usually occur around the acquisition date, while the benefits are realized over the entire holding period (Manganelli, 2015). A method that is used to evaluate the investment decision is a discounted cash flow (DCF) model where the future values are discount against a certain percentage to get a present value (French & Gabrielli, 2005). This model also further uses the time perspective of an evaluation. The DCF method is a widely accepted method for valuing property investments and is also the most used method (Manganelli, 2015).

In the Discounted Cash Flow (DCF) analysis, costs are denoted as the property's investment expenses, while benefits are portrayed through an income stream (Manganelli, 2015). The income stream is often displayed as a net operating income (NOI). The NOI and cash flow is calculated as follows: Potential gross income (rental income) – operating expenses (often percentage of potential gross income) = Net Operating Income (Klimczak, 2010). Another important benefit that is used in a DCF analysis is the exit yield. The exit yield is a valuation method that shows the multiplier of the last earned income (rent) as a percentage against the valuation of the building. If the building is sold for €5 million and the rent was €250.000 it shows a multiplier of 20 or a yield of 5% (Baum, 2009).

Based on the DCF model certain indicators of profitability can be calculated. An important indicator of profitability is the Internal Rate of Return (IRR). The IRR quantifies the return on the invested capital and is expressed in a percentage (Manganelli, 2015).

3

A real estate investment process

Chapter 3 presents a detailed analysis of the real estate investment process. The chapter begins by dissecting the intricacies of the real estate investment process (Section 3.1). Where it shows where the investment decision is taken. Section 3.2 explores the risk and return perspective and showing how this relates to the investment decision.

3.1 Real estate investment process

The real estate sector is complicated, with each type of real estate possessing distinct characteristics, including variation in size, complexity, location, context, time, and budget. As a result, there is not a standardized real estate investment process. A critical planning process is necessary within real estate investment due to the capital-intensive and risk-prone nature (Das, Sah, Sharma, Singh, & Galuppo, 2013). It is therefore difficult to pinpoint a single dominant process. Furthermore, within the real estate investment process, it is not uncommon for certain activities to deviate from the standard process. For instance, it is possible for a building to be sold even before its construction is completed, or for the building plans to be finalized before the purchase of the land has taken place (Hendriks, 2010).

The investment process is part of the real estate development process, which is divided into multiple phases. The development process has been studied by several researchers and each has either more phases or other names for this process (Das et al., 2013). In this study the development process of Gehner (2008) is used: Initiation, feasibility, commitment, construction, and management, which is shown in Figure 12. Gehner (2008), further elaborates that after each real estate development phase an investment decision is made to review the project. Most researchers end the development process after it is completed and in use, including Gehner. Although, after the information retrieved in the theoretical framework it is decided to add the following phase to the development process of Gehner: End-of-life. For the circular economy the end-of-life phase is of importance, this phase is significant because it involves closed-loop systems where materials are recycled, initiating a new process (Rood, 2015). The development process with the end-of-life is shown in Figure 12

Figure 12 - Real estate development process (based on, and adapted from Gehner (2008))

The development process is further described from the perspective of a PERE.

Initiation
The initiation of a development project can occur through various ways, but in most cases, it arises as an opportunity that developers seek to capitalize on. The nature of these opportunities can vary significantly and is contingent upon the type of development involved, such as residential, retail, office, or industrial/logistics. For instance, such opportunities may arise from factors like a zoning change granted by the municipality, the availability of an existing building or parcel of land for sale, tender processes, collaborations sought by other developers, and through a broker office. The initiative to initiate a development process can originate from any of the actors or stakeholders involved in the process who are actively seeking a suitable site or buyer, anticipating on the above-mentioned opportunities (Wilkinson, Reed, & Cadman, 2008).

Feasibility
The feasibility is perhaps the most important stage of the development process for a PERE investor. This is where the investor determines whether the project is feasible within the financial possibilities, and it is highly influential on the eventually investment decision. In general terms the parts of the feasibility are: market research, urban planning, architectural design (small-scale), structural design (small-scale), real estate appraisal, and investment valuation (Manganelli, 2015, p. 86). Nevertheless, for an PERE investor the financial evaluation such as: setting strategy, establishing return/risk goals, forecasting expected returns, market research, real estate appraisal and investment valuation is most important (Farragher & California, 2008). For a real estate investor, it is mainly about the financial feasibility in this phase.

The financial feasibility shows the investor the potential profit in relation to the risks (Wilkinson et al., 2008). During this phase the PERE investor also looks at what type of fund fits best with this development, depending on the pursued return and portfolio of the fund. In addition, another important factor of the feasibility, which was not mentioned by Manganelli (2015), is the timeline. Within real estate, there are inevitably periods of uncertainty as well as times of prosperity. Presently, in the year 2023, the Netherlands is facing several challenges, including the nitrogen crisis, increasing interest rates, a congested energy grid, and the high cost of building materials (Van Der Laan, 2023). These factors contribute to the current uncertainty surrounding real estate investments. Therefore, it becomes crucial to carefully consider the timeline of potential developments and conduct thorough market research to navigate these circumstances effectively. The mentioned parts in the feasibility are all represented in the business case, which is further explained in chapter 5. The phase ends with a decision moment where the investor together with the investment fund examines the business case and decides whether the investor goes to the next phase to commit to the project.

Commitment
During the commitment, the investor directs their full attention to the project at hand to transform the non-binding offer to a binding offer. The phase takes about 6-8 weeks where the investor and the investment fund work on the due diligence of the development. The due diligence is made with the investor and the fund to investigate and examine the facts and details of the development. The small scale architectural and structural design is further elaborated to have a full design for the building. After the full design is determined the final hard and soft cost are calculated and incorporated in the business case. Furthermore, permits are obtained, and if necessary, an anterior agreement is established with the relevant municipality.

Eventually the financial evaluations have been finalized, and funding has been secured. Agreements have been established with various stakeholders regarding design, permits, rental

fees, and exit costs. Up until this point, the investor has minimized cost and has only likely cost has been staff time and professional fees (Wilkinson et al., 2008).

Construction
After full commitment is taken towards the development the construction of the asset can start. In this phase, a significant portion of the allocated funds is expended, leaving little room for flexibility compared to the earlier stages of development. The primary objectives during this phase are to achieve timely completion and stay within the predetermined budget while upholding the highest standards of quality. The investor has still a high influence on the development although involvement has been reduced.

Management
Once the construction phase is completed, the building moves to the management phase. In this phase, the investment costs are earned back through rental income or by the sale of the property. This phase is one of the last phases in the development process but is often considered in the initiation phase, as it is ultimately the phase through which the investor makes its returns (Wilkinson et al., 2008). During this phase the management activities such as maintenance and renovation are of importance.

End-of-life
The final phase of the development process is the end-of-life. This phase was not mentioned by Gehner (2008), but it is added in this process since it has great value in the circular economy. This phase is far in the future but represents the disposal or the selling of the building.

3.1.1 Investment decision

Throughout the development process, the level of investor involvement and influence plays a crucial role in shaping the investment decision. Another conclusion is that for a PERE investor, the investment fund eventually decides if there is a positive investment decision. Figure 13 represents the involvement and influence of the real estate investor during the whole development process. It shows that after the commitment phase the involvement and influence changes for the investor. A conclusion from the previous described phases and this figure is therefore that the investment decisions is made during the initiation, feasibility, and commitment phase and that the construction, management and end-of-life phase are only of influence on this investment decision.

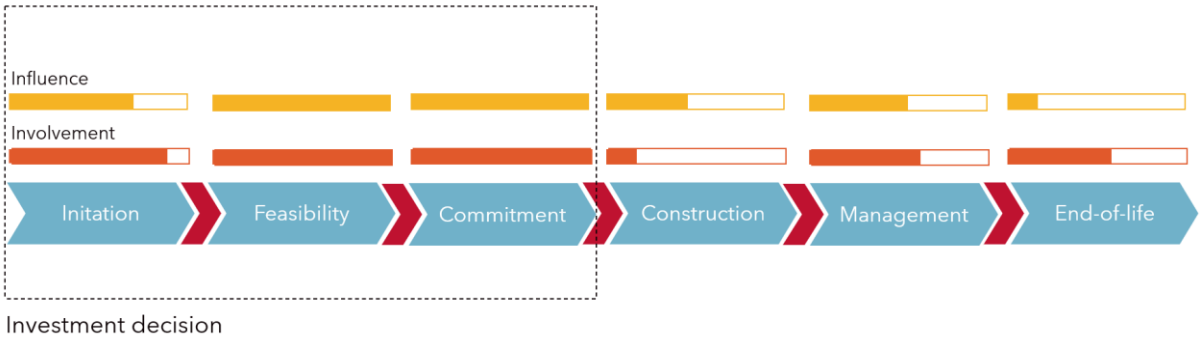

Figure 13 - The Involvement and influence of the real estate investor during the development process, showing the investment decision (adapted from Gehner, 2008).

3.2 Risk and return

The investment decision is based on the risk perception in relation to the returns. According to the literature there is a correlation between the accepted risk and the accompanying return, this correlation is shown in Figure 14.

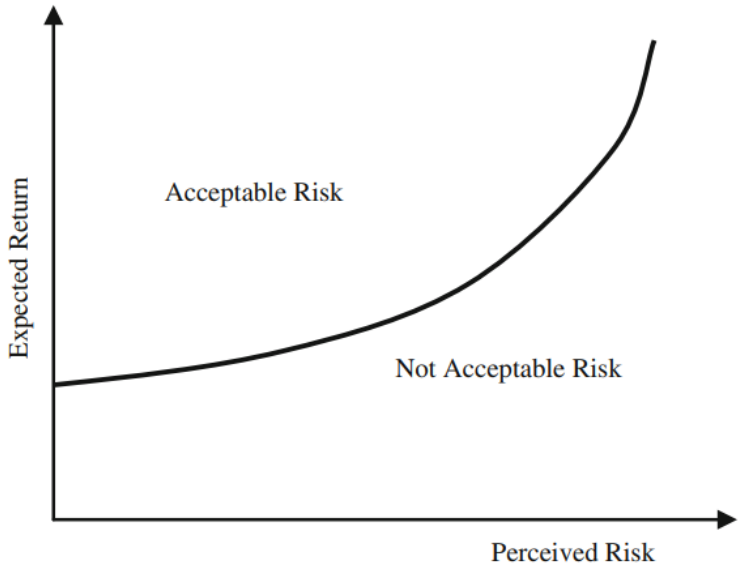

Figure 14 - Correlation between expected return and perceived risk (Manganelli, 2015, p. 84)

The investor is willing to accept a certain risk profile for a maximised profit, keeping in mind that its intension is still to minimize the risks. Illustrated in Figure 14, the risk curve indicates that as risk levels increase, the investor becomes more amenable to accepting a higher proportion of risk in exchange for a higher anticipated return. There is a maximum perceived risk which the investor does not accept no matter what the return is (Manganelli, 2015, p. 84). Figure 14 also relates to the risk return perspective of the different funds which was shown in Figure 11 in chapter 2.

Real estate investors search for the optimal balance between risk and return. This balance is related and based on the goals set by the investor on their financial, risk and investment horizon (Manganelli, 2015, p. 84). Higher-risk strategies that are related to opportunistic funds invest in volatile markets or speculative developments which result in potentially significant returns but do accompany higher risks. Core funds use lower-risk strategies, such as stable developments in well-known markets, which provide stable returns. In essence the expected return and degree of risk should align with the investment funds goals on strategic, financial and diversification level to achieve an investment decision (Farragher & California, 2008). As was mentioned in chapter 2, the funds are grouped into four strategies based on their risk and return profile: core, core-plus, value add and opportunistic funds, which is illustrated in Figure 15. The figure is a translation of the risk and return curve from Figure 11 and Figure 14 to investment funds.

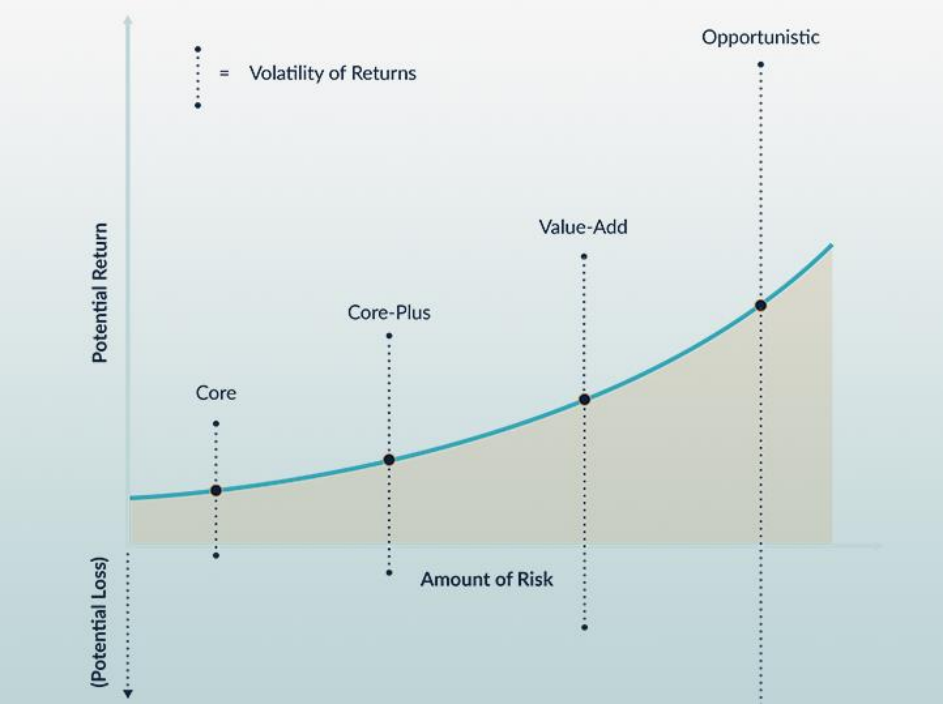

Figure 15 - Risk and return profile of real estate investment funds, from Formigle (2023).

3.3 Conclusion

The real estate development process employed by real estate investors to achieve an investment decision is a multi-faceted and dynamic journey. It encompasses various phases with the primary goal of serving as a functional asset and generating a future flow of income for the investor. PERE investors focus on financial feasibility and strategic alignment to make their investment decisions.

The real estate investment process is marked by its complexity and lack of standardization due to the diverse nature of real estate assets. The development process unfolds through phases such as initiation, feasibility, commitment, construction, management, and even extends to the end-of-life phase. Throughout this journey, the investor's involvement and influence fluctuate, ultimately leading to the investment decision during the early stages' initiation, feasibility, and commitment. Financial feasibility plays a pivotal role, considering the capital-intensive nature of real estate projects. If the financial feasibility aligns with the strategic goals of the fund, the fund gives the go ahead for the investment and thus the development.

Risk and return are important considerations in the investment decision. Investors seek a delicate equilibrium between these factors, aligning with their goals, risk appetite, and investment horizon. This risk-return relationship is illustrated by the risk curve, indicating how investors are willing to accept higher levels of risk for potentially greater returns, up to a certain threshold. In essence, the existing investment process in real estate involves a comprehensive evaluation of financial feasibility, risk, and return throughout the various development phases. It is a dynamic interplay of factors, guided by the investor's goals and market conditions, ultimately leading to an investment decision.

4

Added value of circular real estate

This chapter shows what the added value of circular real estate entails. Showing a real estate investor which values can be steered on in an investment decision for circular real estate development. The chapter is divided into two parts. The first part looks at the added value of circular real estate (section 4.1) on three sub-parts: environmental, social, and green certificates. The second part looks at the financials of circular real estate (section 4.2) and delves into investment costs, maintenance, replacement, and operation costs, rent value, and disposal values of circular properties. The chapter eventually shows what the added value of circular real estate is, giving a real estate investor the support to invest in circular real estate development.

4.1 Added value

In present times, real estate investors receive strong encouragement to channel their investments into sustainable buildings. The rationale behind this lies in the perception of poor environmental building performance as posing significant investment risks (Leskinen, Vimpari, & Junnila, 2020). Consequently, sustainable investment has emerged as a crucial consideration for real estate investors, especially those primarily focused on the financial performance of their properties. Sustainable investment in the real estate sector is often displayed in Environmental, Social and Governance (ESG) values. ESG-investing has increased attention in global sustainable investment and has close relations with the sustainable development goals of the United Nations (Henisz, Koller, & Nuttall, 2019). The added value of circular real estate development is further discussed below.

4.2.1 Environmental value

The initial way of circular construction was discussed in chapter 2.1, where it discussed the essence of circular construction. This construction method results in numerous environmental benefits. Wuni (2022), researched the benefits that accompany circular construction. The results showed that numerous benefits where related to environmental benefits, and where also mostly discussed in the literature. The most cited benefits are discussed below.

Reduces natural resource consumption, construction and demolition waste, and depletion of virgin materials.

Circular construction diminishes resource and material usage by implementing substitution techniques. This approach involves closing material cycles, transforming construction and demolition waste into valuable by-products and remanufactured components. These recycled materials substitute virgin raw materials in the construction process, thereby reducing the overall consumption of resources and promoting sustainability (Superti, Houmani, & Binder, 2021). In practical terms, this means that materials once discarded after demolition or construction are reintegrated into the building process. These recycled materials not only reduce the demand for virgin raw materials but also contribute to the development of a more sustainable construction ecosystem.

Reduce greenhouse gas emissions.
The above-mentioned reduction benefits for resource consumption C&W waste and depletion of virgin materials all add to the reduction of greenhouse gas emissions. It further showed that the previous discussed circular design strategies from chapter 2.1.2 result in a significant reduction of greenhouse gas emission or CO2 (Minunno, O'Grady, Morrison, & Gruner, 2020).

Reduced energy consumption
Energy consumption can be reduced using close circuit energy systems. For example, heat generated in the building can be used for heating rooftops, or smart-closed energy grids can be created so that neighbouring entities can profit from the energy production (Centobelli, Cerchione, Ertz, & Oropallo, 2023).

4.2.2 Social value
Circular buildings are often more flexible, allowing them to cope better with changing functional needs or even changes in function. Moreover, with circular buildings, there can be less vacancy, which has beneficial effects in the form of less loss of rent and lower risks (Copper8, 2021). It was further found in the study from Wuni (2022), that the circular economy in the building industry results in employment opportunities which in terms generates money for the government. The research further shows that circular construction creates economic value through facilitating investments in social equity, social welfare, and community development.

4.2.3 Green certificates
The level of sustainability in a building is often displayed by green certificates such as BREEAM and LEED. Both have close relations with circular design principles and add value to circular buildings. The BREEAM and LEED certificate also look at a broader spectrum of values in a building such as the social and healthiness of the tenants. The certification is a direct result of the environmental and energy efficiency of the building (Reichardt, Fuerst, Rottke, & Zietz, 2012).

4.2 Financials of circular real estate
As was earlier explained, real estate investors work primarily with three important values in their models: the construction cost, rents, and the exit yield. To maximise returns, construction costs are minimised and DCF models have a small time-horizon to anticipate risks. The combination of the DCF models and the additional construction cost make it difficult for real estate investors to consider the financial justification. The financials of circular real estate development are therefore one of the biggest barriers in adapting to a circular economy (Adams, Osmani, Thorpe, & Thornback, 2017; Lambert, 2021). Although, there is financial value in circular construction, but it is yet to be optimized by the real estate industry. The financial value is further explained by first looking into investment and operation values then rent values, and finally disposal values.

4.2.1 Investment values
The investment cost, which includes the acquisition of land and construction cost of a real estate development account for the highest contribution to the LCC, which is around 58-88%. The operating, maintenance, and replacement cost account for 11-34%, and the disposal 0-2% of the LCC (Islam, Jollands, & Setunge, 2015). The investment cost Is therefore the most significant part of the development. Within circular real estate, the construction cost (materials and labour) of circular real estate is currently higher than linear construction, which has to do, among other things with the search for recycled materials, labour or the research and design of new circular products (Copper8, 2021). The market for circular products is young and different, competing

with optimized linear products is therefore challenging (Charef, Morel, & Rakhshan, 2021). Copper8 (2022) investigated four circular real estate cases in the Netherlands on their construction cost. Two of these projects are construction/renovation projects, and two are demolishing/demolition projects. The investment costs for circular projects were consistently higher than those for linear construction in all four projects. The increased investment costs ranged from 1.7% to 7% compared to the linear alternative. They concluded that the increase in material cost comes down to more labour. Furthermore, the increase in investment cost is really depended on the type of circular construction. For example, a full wood logistic hall has an increase in investment cost of 20-40% compared to its steel hall (quotation wooden contractor, 2023). This increase is way more significant than the projects examined by Copper8. It is therefore important to note that the increase investment cost is dependent on the type and percentages of circular construction.

4.2.2 Operating, maintenance, and replacement cost

There was limited literature available regarding operating costs when implementing circular construction methods. This aspect was not further explored, primarily because operational costs are very marginal in the business case and are often estimated as standard percentages of the NOI. Furthermore, even if the operating cost are reduced with circular real estate development, it is not expected that this cost would reduce by half but only marginal percentages, which could be neglected in the business case according to a development director at a PERE investor (personal communication, October 2023).

4.2.3 Rent values

Rent is one of the most important income streams for the investor and is based on many factors, such as location, size, installations, energy use, quality and many more. When looking at green buildings there is a possible rent premium involved, based on the certification of the building. Mangialardo et al. (2018), showed an analysis for rent and market premiums in green buildings. This literature review showed that there is an increase in rent for green office buildings, which varies between 0,41% - 17,30% depending on the type of certificate and green attributes of the building. Their own case study showed that there is a price premium of 7% - 11% for Gold and Platinum certified LEED buildings. Furthermore, investors often incorporate a vacancy rate in their models. Although, the absorption rate of certified buildings is four times larger than for non-certified buildings (Mangialardo et al., 2018). Sustainable buildings are a certified driver for market value of the property, and it is translated in the rent level.

The current lease structures in the Netherlands also contribute to a higher rent premium for green office buildings. In the Netherlands a tenant pays rent for the office building and is responsible for operation cost such as electricity, gas, and small maintenance. Tenants are willing to pay extra (rent) for a building that has lower operating cost. For their view the total payment (rent plus operating cost) matters (Leskinen et al., 2020). There is also a social aspect to the rent level of circular buildings. Bigger companies who are very depended on their reputation, are sustainable driven or want to improve their reputation are willing to pay extra for a circular building. Assuming the rental price is higher for a circular building.

4.2.4 Disposal values

Disposal value is characterized as the net cash flow receivable or payable that is released when an asset is disposed of or sold at the end of its useful life (Deloitte, 2019a). For linear real estate this comes down to the disposing of the building in the form of selling or demolishing. If the building is sold the investor receives an amount that a legal entity would now receive for the

asset on disposal after deducting estimated disposal costs (Deloitte, 2019a). During demolishing, the investor is responsible for covering the costs involved or may even receive certain benefits from the demolition contractor. It is worth noting that demolition companies presently operate under a lucrative business model that involves extracting materials from disposed assets (Deloitte, 2019b). Moreover, investors now find themselves in a position where they must pay for the demolition of the building, while the demolition company reaps the benefits derived from the process. For circular real estate, this also comes down to disposing of the building in the form of selling or demolishing. With circular real estate there is value in the disposal cost, but it depends on the type of design principles that are applied.

Selling price

It is possible that circular real estate development translates (ultimately) into a higher sales price of real estate properties compared to its linear opposite (Deloitte, 2019b). The valuation of the building has an important position in the finance of real estate development and the investment decision is to a large extent based on this valuation. If circular real estate positively influences the market value of the building there is an incentive for investors to make investment decisions on circular development (Warren-Myers, 2012).

Leskinen et al. (2020), reviewed several studies on the increased sales price of certified buildings (BREEAM and LEED). Their result show that the sale price premiums of sustainably/certified buildings varied between 0% - 43%. This increase is rather large and differs depending on what type of real estate class. Although, this rather large increase in sales price is represented as the sum of the additional benefits, such as the brand value of the certificates, increased capitalized value and the lower capitalized rates (risk) (Leskinen et al., 2020).

Furthermore, Vimpari and Junnila (2014) investigated a case where the same building was presented to a group of real estate stakeholders to assess its value. First the building was presented as a normal building and then as a certified LEED excellent building. A DCF model was used to value the building and the interviewees valued the certified building 9% higher compared to the normal building. It shows that the valuation of the building increases with the level of sustainability that is present.

Residual value

With a circular economy the building materials of a circular real estate development can be reused, recycled, or remanufactured. There is now residual value in the building, instead of paying extra for the demolition contractor. Although attaching value to the residual product of materials is currently still very difficult, also because this moment is far in the future (50 to 75 years) and has many uncertainties (Adams et al., 2017). In addition, Kok & Koning (2019) showed that the cost of dismantling and refurbishment of the residual product is not always covered by high value reuse. This further adds to the already mentioned risks with the value of these materials.

Since there is too much risk to add value to this end-of-life point, the depreciation in the DCF models of a real estate investment is deprecated to zero (Copper8, 2021; Deloitte, 2019b). Figure 16 shows how the depreciation of a generic building looks over time.

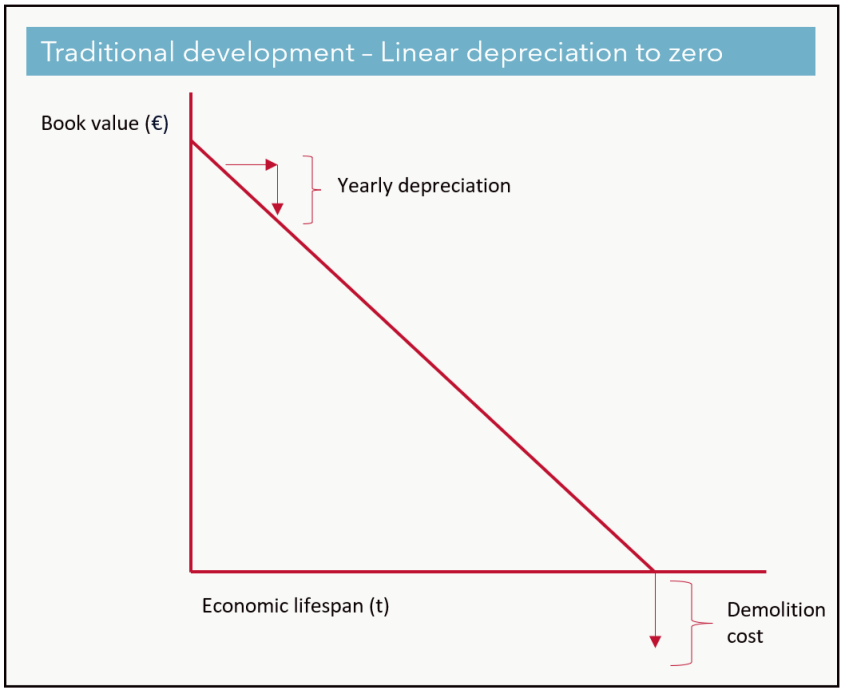

Figure 16 - Depreciation over time for a traditional development adapted from Deloitte (2019b).

Although according to (Claassen, 2021) the depreciation does not have to go to zero if the residual product has value. If we can assume that a residual value can be obtained by harvesting the materials, the depreciation would appear as illustrated in Figure 17.

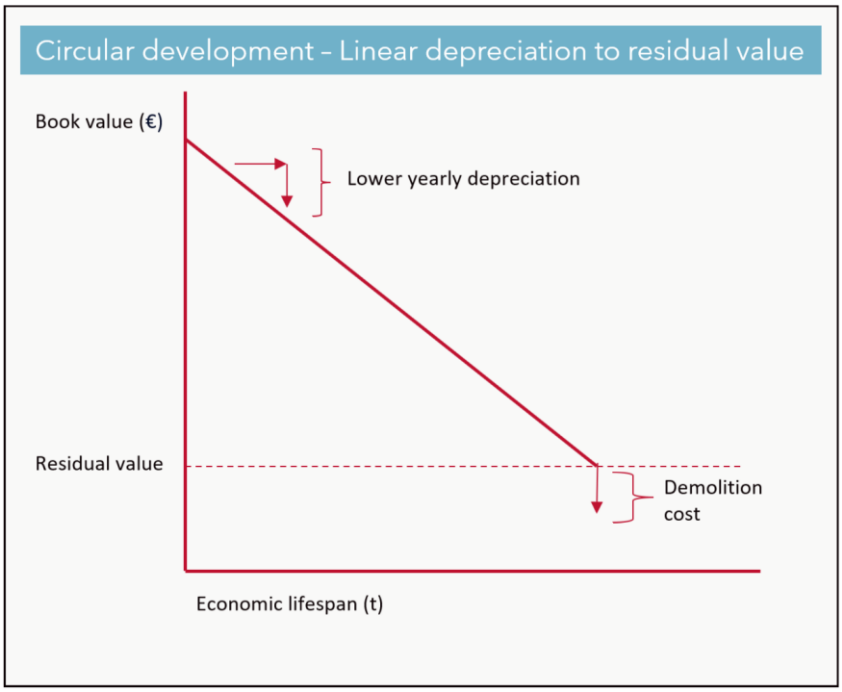

Figure 17 - Depreciation over time with circular development, adapted from Deloitte (2019b).

The residual value can play an important role in establishing a feasible business case for circular real estate development. The construction cost is the largest investment in the life cycle of the building, recovering value from this initial investment is crucial to counter the increase in investment. The level of the residual value is also very dependent on the level of circularity that is applied in the building. The residual value is subjective to the extent the materials can be

reused or recycled and any accompanying disassembly cost. Furthermore, valuation challenges exist with the residual value of circular materials/buildings. In the DCF models a discount rate is used to discount the future values to the present value. When the future value lies far in the future the residual value approaches near zero. There are different ways to calculate the residual value of building materials and components (Fregonara et al., 2017), although these are not incorporated in the business case calculations of a real estate investor. This is often depicted in the exit yield, the lower this exit yield is the more return is expected after the hold period. A possible way to factor the residual value of a building in the business case is to translate it into this exit yield.

4.3 Conclusion

In conclusion, the added value of circular real estate development is multifaceted and encompasses various dimensions of the development process. While circular real estate development may present initial challenges and higher investment costs compared to linear construction, its long-term benefits can lead to enhanced financial performance and sustainability.

Circular real estate development embodies sustainable principles, offering substantial environmental, social, and economic value. By closing material cycles and reducing waste, it minimizes resource depletion and greenhouse gas emissions. The flexible design reduces vacancy rates, enhancing societal welfare and community development. Green certifications like BREEAM and LEED recognize these benefits, making circular buildings valuable investments.

Additionally, the market recognition of sustainable attributes, coupled with potential reputation benefits for tenants, can justify higher rental and sales prices for circular real estate. Furthermore, circular real estate development introduces opportunities for capturing residual value from building materials through reuse, recycling, and remanufacturing. While challenges exist in quantifying and realizing this value over extended timeframes, the potential for future revenue streams from circular materials can offset initial investment costs and improve the financial outlook of circular projects. Innovative approaches like adjusting exit yields, can help incorporate the full potential of residual value into the investment analysis.

In summary, while circular real estate development may require a shift in traditional investment models and cost considerations, its sustainability benefits through ESG-investing and its long-term financial benefits, including increased market value, rent premiums, and opportunities for residual value capture, position it as a promising avenue for sustainable and financially viable real estate investments.

5

Feasible business case

This chapter looks at what conditions and factors lead to a feasible business case for real estate development. The chapter first identifies the components of a business case (section 5.1). The final part looks at the factors and conditions that are related to a business case (section 5.2)

5.1 Components of a business case

A business case for a real estate development typically includes several components to provide a comprehensive understanding of the project's feasibility. The business case is used as the background for the final investment decision and consists for the larger part of future financial assumptions. These assumptions play a critical role in the credibility of your business case but also the reduction of uncertainty (Schmidt, 2009). Although these assumptions need to be substantiated, this is done through a report or presentation by the business case builder. The components of the business case are therefore twofold a financial feasibility model and a presentation. Figure 18 shows the business case schematically.

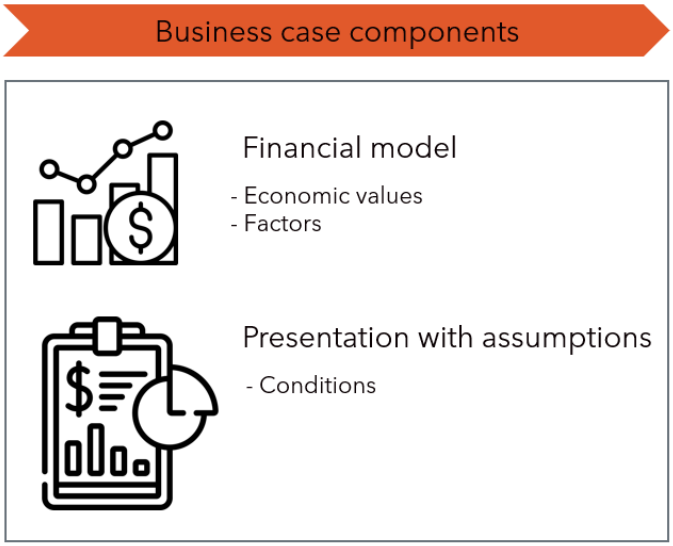

Figure 18 - Components of a business case for real estate development

5.2 Factors and conditions

The business case is depended on factors and conditions. Where factors are represented close to the model and are a quantitative representation of risk and return and conditions determine the level of the factors. The identification of the factors and conditions is a combination of literature review, informal conversations with a construction and development director from a REPE investor (personal communication, July 2023), and the review of approved real estate investment decisions from an REPE investor operating in the Dutch market.

5.2.1 Conditions

Klimczak (2010) identified a set of important determinants that determine the profitability of investing in real estate: The purchase value of the estate, the income, operating cost, time of entering and retreating the investment, time of owning, cost of capital involved, and legal regulations. Although Klimczak's determinants offer a comprehensive overview, the intricate nature of real estate investing often demands the use of advanced financial models and nuanced information. Moreover, in an informal conversation with a construction and development director (personal communication, July 2023), A perceptive insight surfaced, revealing that the business case derives from a condensed set of conditions that wield significant influence over the overall feasibility of the business case and, consequently, the investment decision. In combination with Klimczak's determinants, these conditions collectively constitute the fundamental underwritings of the business case. While acknowledging the intricacies inherent in each condition, they essentially delineate the essential considerations shaping the real estate investment decision. Six conditions were identified: *cost, returns, timeline, market development, sustainability, and strategic portfolio management*. The combination of the reviewed business cases, informal communication, the determinants of Klimczak, and literature led to this set of six conditions. The six conditions are further explained and shown in Table 1.

Table 1 – Conditions related to the business case for an investment decision

Condition	Explanation
Costs	This condition encapsulates a multifaceted consideration of various capital expenditures associated with the investment throughout its lifecycle. Such as the land cost, construction cost and operating, maintenance and replacement cost. In summary, the condition of "cost" within the business case of real estate investment is a comprehensive evaluation of the financial implications associated with the purchase, operation, and financing of the property. Analysing and managing these costs effectively is essential for ensuring the economic viability and profitability of the investment, where cost should be minimized as much as possible.
Returns	The condition "returns" holds paramount significance as it directly correlates with the financial gains and profitability associated with the investment. Firstly, the income generated from the property, such as rental income or other revenue streams, is a central component of the return's consideration. This aspect reflects the financial yield derived from the utilization or lease of the real estate asset. In summary, the condition of "returns" in the business case of real estate investment encompasses the assessment of income streams, temporal considerations, and the duration of ownership. Effectively understanding and managing these aspects is essential for optimizing the financial returns and ensuring the overall success of the investment, while in essence the returns should always be maximized.
Timeline	The timeline for real estate investing refers to the duration of various stages involved in acquiring, owning, and potentially selling a real estate property. The time of entering and retreating from the investment is a key consideration within the timeline condition. The entry point can significantly impact the overall success, influenced by market conditions, economic trends, and investment goals. Similarly, determining the optimal time to exit the investment is essential for realizing maximum returns, as it aligns with market peaks or strategic goals. Although, this condition is not just based on the time of entering and retreating in the investment object as described by

	(Klimczak, 2010). It is also about the duration of the construction period, time of external financing, hold period and profit realization. The timeline should align with current market dynamics and financing availability.
Market development	The condition of "market development" assumes a pivotal role in assessing the broader economic landscape and its impact on the investment. Market development encompasses an analysis of trends, economic indicators, and potential growth or contraction within the geographic area where the property is situated. This condition recognizes that the success of a real estate investment is intricately tied to the overall health and trajectory of the market. In summary, the condition of "market development" in the business case of real estate investment underscores the necessity of a proactive and informed approach to the external economic factors shaping the investment landscape. Successfully navigating this condition enhances an investor's ability to capitalize on opportunities, mitigate risks, and make strategic decisions aligned with the evolving dynamics of the real estate market. Furthermore, the condition market development has close relation to all other conditions. The cost, returns, timeline, sustainability, and portfolio are all depended on the market development.
Sustainability	The condition of "sustainability" has emerged as a critical factor, reflecting the growing emphasis on environmental, social, and governance (ESG) considerations. Sustainability in real estate investing refers to the practice of considering environmental, social, and economic factors in property acquisition, development, management, and operation. The goal of sustainable real estate investing is to create long-term value while minimizing negative impacts on the environment and benefiting the surrounding community. In summary, the condition of "sustainability" in the business case of real estate investment underscores the importance of aligning investments with broader environmental and social goals. Successfully integrating sustainability considerations enhances the resilience and attractiveness of the investment in an evolving real estate landscape.
Strategic portfolio management	The condition of "strategic portfolio management" serves as a requirement, encapsulating the overarching strategy for assembling, maintaining, and optimizing a diverse and balanced real estate portfolio. Strategic portfolio management encompasses the deliberate selection of properties based on a set of defined investment objectives, risk tolerance, and market conditions. It involves an assessment of the potential synergies, diversification benefits, and overall coherence of the portfolio. This condition recognizes that the success of individual investments is intricately tied to their collective contribution to the broader investment portfolio of the investment fund.

The six conditions, subsequently influence a multitude of other factors, aspects, and values. It is of importance that these conditions are in harmonious concordance with the real estate investor's overarching objectives and investment strategy. As was described in the Sub-chapter 5.1 the business case exists of a financial model and an assumption report or presentation. The conditions are depicted in the business case through values present in the financial model. These values are shown in Table 2 and are an input of the business case.

Table 2 - Conditions represented as values in the financial model with explanations.

Conditions	Represented in the financial model through these values	
	Values	**Explanation**
Cost	• Hard cost	*Direct construction cost of the developed and land cost.*
	• Soft cost	*Fees for PERE investor, and consultancy cost for the developer.*
	• Capital expenses	*Land cost and hard cost.*
	• Operational expenses	*Operational expenses during the hold period.*
Returns	• Estimated Rent Value	*Estimated value for rent.*
	• Net Operating Income	*Estimated rent value – Operational expenses.*
	• Exit Yield	*Estimates the resale value of the investment at the end of the hold period, displayed as a percentage. The NOI at the end of the hold period is divided by this percentage to get the resale value (Kenton, 2021).*
Timeline	• Hold period	*The calculation period for the investment*
	• Loan to Value (LTV)	*The ratio between equity and external financing*
Market development	• Hold period	
	• Loan to Value	
	• Indexation	*The indexation amount on the loan, ERV, and hard cost*
	• Hard cost	
	• Soft cost	
	• Estimated Rent Value	
	• Exit Yield	
Sustainability	• Estimated Rent Value	
	• Exit Yield	
	• Hard cost	
	• Soft cost	
	• Operational expenses	
Strategic portfolio management	Is not directly represented in the business case through a value. The values in the financial model should align with the current portfolio of the investment fund.	

5.2.3 Factors

The conditions and values described above influence the factors related to the business case. The factors are an outcome of the financial model. These factors serve as the ultimate benchmarks that guide the fund's eventual investment choice and are explained in Table 3. Figure 19 shows how the values and factors are related to the business case in a real estate development. Essentially, the factors encapsulate financial management indicators that gauge the feasibility of the development:

Table 3 - Explanation of the factors related to the business case in a real estate development.

Factor	Explanation
Internal rate of return (IRR)	The IRR is a discount rate that makes the net present value of the total cash flow to zero. It is often a percentage between 7%-16% depending on the hold period (Ganti, 2023).
Cash on Cash (CoC)	CoC is displayed as a percentage that shows the annual return (NOI) divided by the total cash amount invested.
Development yield	The development yield shows the percentages of the estimate rent value divided by the total development cost (hard cost, land cost and soft cost) (Bergin, 2023).
Equity multiple (EM)	The equity multiple shows the ratio of equity invested in comparison to the cost over the whole period. (Vijay, 2023).
Development spread	The development spread shows the percentages of the development yield divided by the exit yield (Wall Street Prep, 2023a).

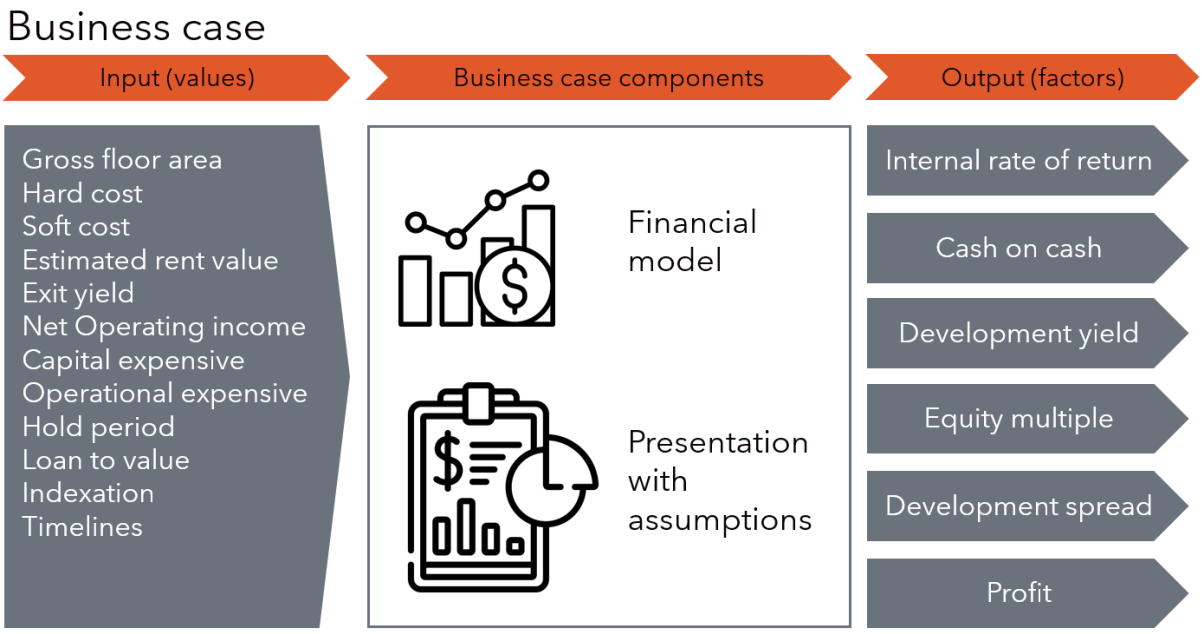

Figure 19 - Relation of the values and factors to the business case in a real estate development (own figure)

These factors reflect the conditions. Not all factors from Table 3 are used in each development. It is very depended on the investment fund; some funds add more value to an IRR and others to a CoC. The financial management factors are the eventually number or percentage that the investment decision is based on from a financial model perspective according to a development director from a PERE investor (personal communication, July 2023). It is therefore difficult to determine what kind of value leads to a feasible business case. This is because it is so dependent on the fund's strategy and the risk and return profile involved in the development.

5.3 Conclusion

In conclusion, a business case for real estate development is influenced by a combination of conditions and factors that collectively determine the potential success of an investment. These conditions encompass various aspects, from costs and returns to the timeline and market development. The underpinning of a business case relies upon the intricate interplay of both conditions and factors. Factors, acting as quantifiable representations of risk and return, operate

near the financial model, while conditions influence the overall investment. The relation between the conditions and the business case are shown in Figure 20.

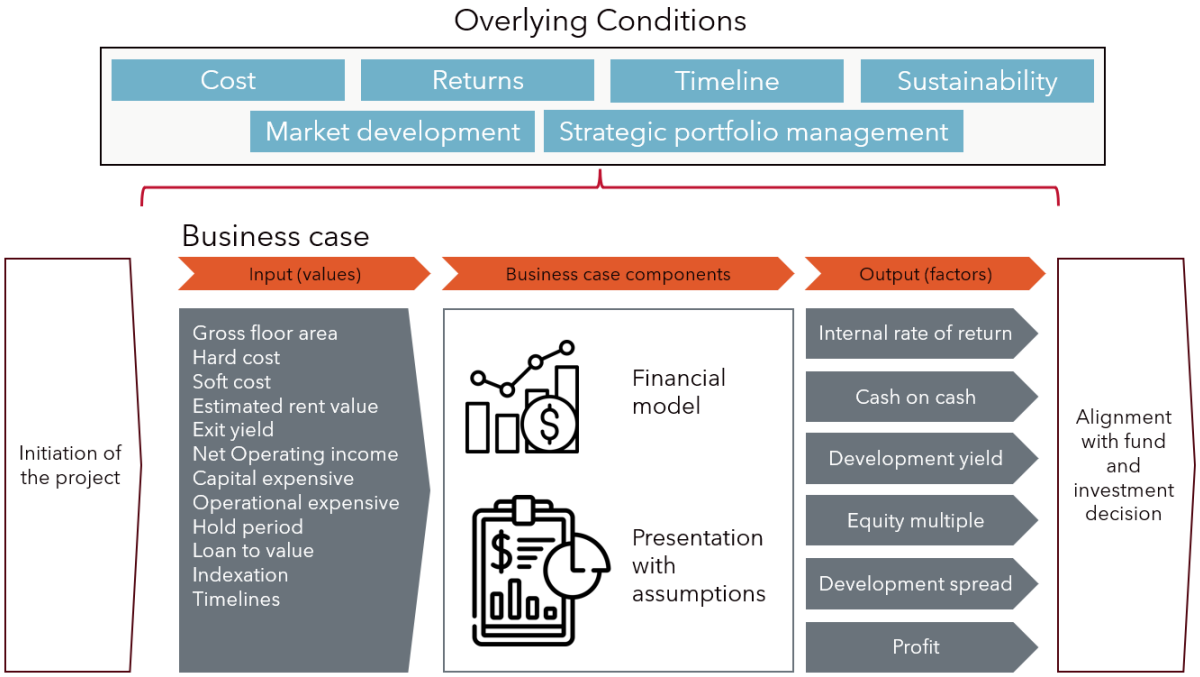

Figure 20 - Relation between the conditions and the business case in a real estate development (own figure)

The real estate development is dependent on the following six conditions: cost, returns, timeline, market development, sustainability, and portfolio. A feasible business case is realized when costs are minimized, returns are optimized, the timeline aligns with current market dynamics and financing availability, market development proactively responds to emerging trends while avoiding risky markets, long-term value creation is achieved with sustainability efforts that benefit the environment and local community, and the development seamlessly integrates into the existing real estate portfolio, fostering a diversified collection that aligns with strategic objectives.

6

Research methodology

The chapter elaborates on the research methodology used in this study. The chapter starts by detailing the chosen methodology (Section 6.1), offering a comprehensive understanding of the approach that underpins the research. Subsequently, the chapter delves into the different data collection methods (Section 6.2), outlining the diverse sources and techniques utilized to gather the necessary information. It then transitions to data analysis (Section 6.3), after which it shows the case description that is used in the results (section 6.4).

6.1 Choosing research methodology

The objective of this study is to design a feasible business case for circular real estate development from the perspective of a real estate investor. To come to this business case the study utilizes action research. Action research is a combination of theoretical insights and practical application, with its primary objective to gain new knowledge while improving practice (Williamson, 2002). The reason behind this choice is the substantial opportunity from a practical standpoint that lies within a PERE investor to engage in a practical, real-world case study. This would result in a significant learning opportunity where theoretical insights can be applied to a practical application. The research method is an iterative process that is conducted between practitioners and researchers who act on a cycle of activities (Avison, Lau, Myers, & Nielsen, 1999). In this study a continuous and iterative process of two cycles of plan, act, observe and reflect is used. The two cycles used in this study are displayed in Figure 21. In each cycle, during the Act phase data is collected in a different way, which is further explained in the next sub-section.

In the first cycle, sub-question 4 is addressed. To prepare for the Act phase, I evaluated various circular design strategies, which were discussed in section 2.1, making necessary trade-offs. These strategies guide the subsequent data collection phase where a focus group discussion was held centred around the business case elements for a circular real estate development. During the data collection observations were gathered from participants, which is further described in section 6.3. In the Reflect phase, the collected data was thoroughly analysed, and findings were critically examined. Based on these reflections, adjustments were made to the plan as needed for the upcoming cycle. The second cycle started with using the findings from the first phase to develop a feasible business case for circular real estate development (Plan), followed by a presentation and discussion of this case with an investment fund (Act), where the fund gave an investment decision on the business case (Observe).

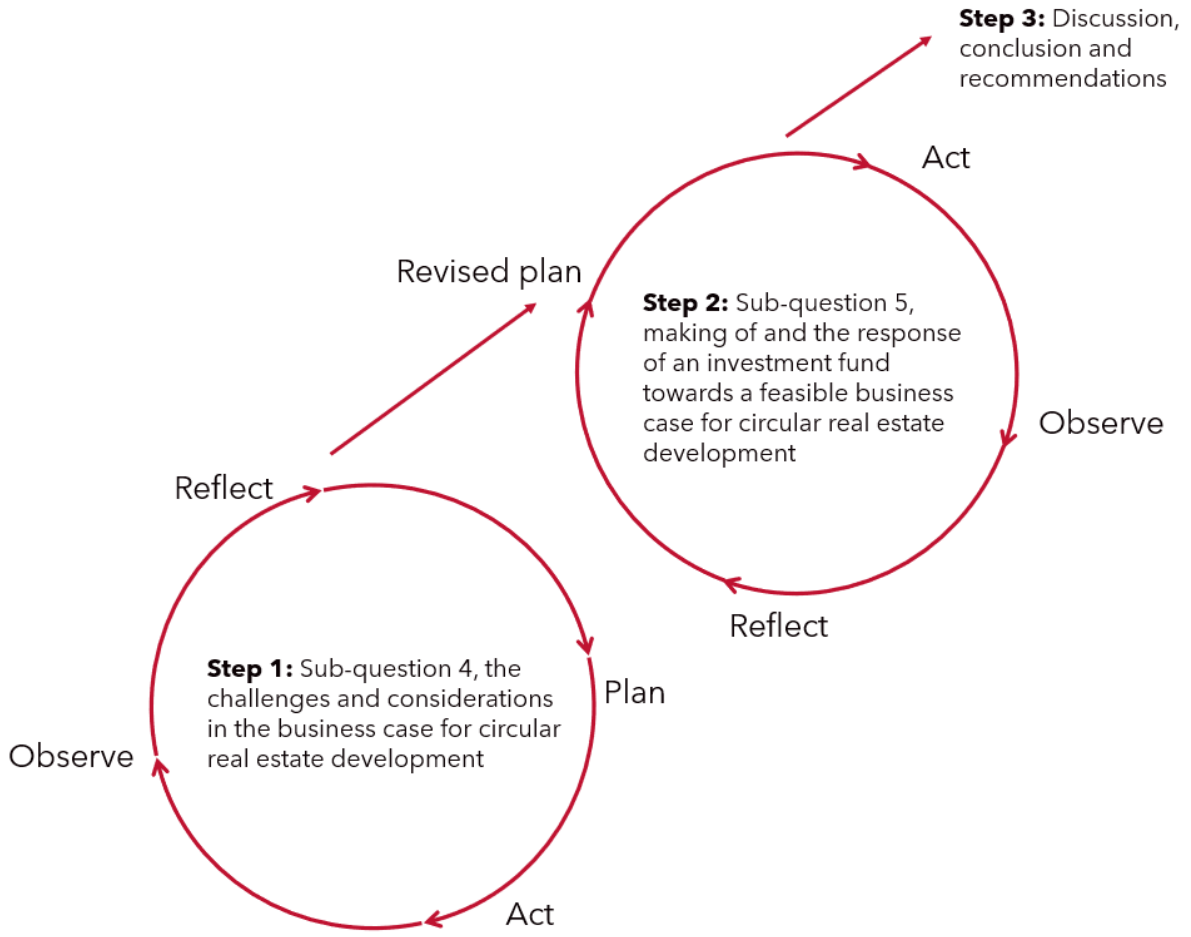

Figure 21 - Research methodology, two cycles of Plan – Act – Observe – Reflect, adapted from Altrichter, Kemmis, McTaggart, and Zuber-Skerritt (2002).

6.2 Data collection

Two broad approaches that exist within data analysis and collection are qualitative and quantitative research. Quantitative research is based upon numerical and statistical data focussing on quantifying data (Vishnevsky & Beanlands, 2004). Qualitative research is more based upon observations to understands people's attitudes and behaviours (Pathak, Jena, & Kalra, 2013). With qualitative research the emphasis lies more on describing and understanding the findings rather than predicting and controlling (MacDonald, 2012). Moreover, the major points of this study: circular real estate and real estate investments are part of normal everyday process of the built environment (Amaratunga, Baldry, Sarshar, & Newton, 2002). The research methodology of action research, coupled with the close collaboration with individuals engaged in everyday processes, aligns seamlessly with qualitative data collection. This choice is rooted in the study's emphasis on reflecting real-life scenarios, making qualitative research the preferred approach for this investigation. Data is collected through two qualitative methods: During the first cycle data was collected through a focus group discussion and during the second cycle data was collected through a presentation.

Additionally, related information was gathered through informal communication with a construction and development director who, are affiliated with a PERE investor operating in the Dutch real estate market. These interactions primarily involved asking specific questions related to the research, thereby adding to the practical part of the research. Table 4 shows the list of the informal communication.

Table 4 - Informal communication participants

Informal communication	Explanation	Date
Construction director	**Cost expert construction.** • Informal conversation on what conditions is of importance in the business case.	July 2023
Development director	**Commercial expert real estate** • Informal conversation on what conditions is of importance in the business case. • Informal conversation about the operating cost and the investment management factors.	July 2023 & October 2023

6.2.1 Group meeting

For the first cycle, the method that was used was a single focus group discussion. During the focus group a small selection of participants were selected to discuss the challenges and considerations of circular real estate. The four selected participants are all part of the development team of a PERE investor, which was also the reason for their selection. Focus group discussions are a great way to discuss personal experiences, perceptions, and attitudes towards the subject (Nyumba, Wilson, Derrick, & Mukherjee, 2018). A focus group discussion, as opposed to individual interviews, was chosen to encourage interaction among participants, allowing them to respond to each other's statements. This approach aligns with action research, aiming to create a practical setting where participants engage in discussions within their respective roles, fostering collaborative dialogue and valuable insights. During the focus group session, the researcher takes a peripheral role and is seen as a facilitator or moderator for the session, so that the participants together with the researcher improve practice (Nyumba et al., 2018).

Table 5 shows the participants that were selected for the single focus group session. All the participants are part of the same PERE investor operating in the Dutch market. The reason for this selection is that in a normal real estate development this group would also engage in the development.

Table 5 - Participants single focus group discussion

Participants role	Explanation
Construction director	Cost expert construction
Development director	Commercial expert real estate development
Construction manager	Technical expert construction
Development manager	Employee

6.2.2 Investment fund meeting

In the second cycle, data was collected through an investment fund meeting where the researcher presented a business case for a case study on circular real estate development which is further explained in the next sub-chapter. The reason for this investment fund meeting stems from the investment process that was discussed in sub-chapter 3.1, where this meeting is also used during the normal development process. During the meeting the researcher presented the business case by means of a slide deck which was sent 24 hours in advance together with the Feasibility model (Excel format), as was discussed in sub-chapter 5.2. This is in line with the normal process of an investment decision, and this was also the reason for this method of data

collection. Although due to time limitations and limited information on new/potential tenants the Feasibility model was simplified and reduced to only two taps: Feasibility and Cash flow analysis (DCF analysis). Although this is somewhat of a reduction it was still seen by the investment fund as sufficient to make an extensive investment decision. The selection of this investment fund is based on the case study selection, which is described in sub-chapter 6.4. The fund owns the building chosen as the case study through a leasehold agreement, and the participants are affiliated with this fund.

During the meeting the researcher presented the slide deck in about 10 minutes. After the presentation, the investment committee could ask questions about the supplied materials they obtained. These questions were mainly about ambiguities, issues, and risks. The meeting was planned for an hour where after the remarks of the committee the researcher could ask questions about their decision. Table 6 shows the participants that were present during the investment committee meeting.

Table 6 – Participants investment committee meeting

Participants role	Explanation
Portfolio manager fund	Oversees the current portfolio and is accountable for future investments for the fund.
investment management fund	Financial expert of investments related to the fund.
Construction director	Cost expert construction
Development director	Commercial expert real estate development

6.3 Data analysis

The single focus group and investment committee meeting offers qualitative data which can be extensive for analysis. A qualitative analysis that can be used to analyze group data is qualitative content analysis (Nyumba et al., 2018). Content analysis is a systematic technique of summarizing large amounts of text and inferencing them to identify, and analyze patterns, often done by rules of coding (Friese, Soratto, & Pires, 2018; Stemler, 2000). Content analysis was chosen for its suitability in handling large volumes of text and organizing them into categories (Stemler, 2000). Despite the data not being excessively large, it was a perfect fit due to the predefined specific categories (conditions) outlined in chapter 5.

The content analysis was performed in a manifest way. A manifested content analysis stays close to the actual conversation that happened, using the words that were said in the focus group and investment committee meeting, which are obvious and visible in the text (Bengtsson, 2016). In contrast to the manifested analysis, it was decided to not use a latent analysis since it was not necessary to look at the deeper meaning of the text.

A blended approach was used for the analysis, so a combination of deductive and inductive coding. The decision was taken to initiate the process with a deductive approach, allowing the coding to have theoretical relevance and structure (Skjott Linneberg & Korsgaard, 2019). Subsequently, once the data is acquired, an inductive strategy is employed to finalize the coding. The blended approach assures that both the theoretical and pre-investigated information is used in the coding, after which the data will give new knowledge on the subject and gives nuance to the coding frame. The pre-determined coding framework consists of the theoretical framework and the defined conditions and factors from chapter 5.

The audio of the group meetings was recorded and transcribed to a single text file. The content analysis was carried out by the software program Atlas.ti 2023, which organizes the content and data systematically by means of coding. The following steps were used to analyze:

1. Transcribing audio by the researcher.
2. Creating codes based on defined theoretical framework (chapter 2) and factors and conditions of chapter 5.
3. Importing transcript into Atlas.ti.
4. Reorganizing codes based on repetition and corrections, and adding relevant codes based on the data obtained.
5. Reporting results: Identify patterns and make observations based on the codes on the analysis.

Figure 22 shows the final coding framework that was identified before the first data collection. The coding frame is derived from the information that was described in the theoretical framework (chapter 2) and the conditions and factors (chapter 5) that are of influence on the business case (marked in green). The blue marked boxes are the coding that emerged from the data during the discussion session. The coding process is divided into first order and second-order coding.

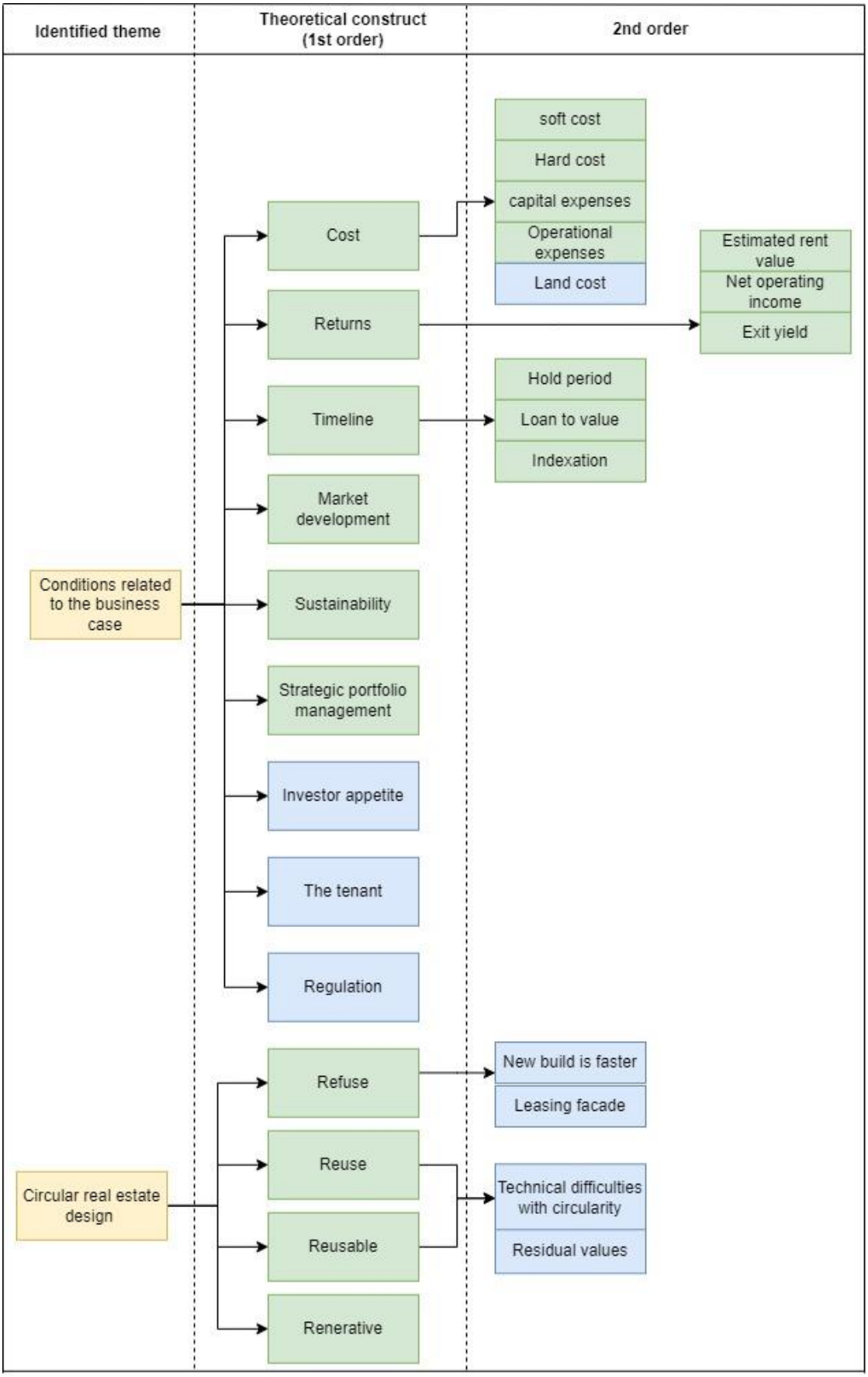

Figure 22 – Deductive and inductive identified coding frame based on chapter 2 (Theoretical framework) and chapter 5 (conditions) shown in the green marked boxes. The blue marked boxes represent the coding that emerged from the date (own figure)

6.4 Case description

The case study is obtained from a PERE investor and developer from the Dutch real estate market. The case consists of two buildings: K3851 and K3852, located at a logistics agro-food production park. The park is already owned by the PERE investor through a core/core-plus fund. The building is shown in Figure 23 below. Both buildings are currently vacant. The land underneath is owned by the PERE investor through leasehold interest. The asset in the current state is barely relatable and would need extensive refurbishment. Regarding the office space, there is no demand for this type of office space, for the tenants that are located on the park. The need for a larger warehouse with a minimal office space requirement contrast with the existing building, which primarily features a spacious office area. Consequently, the new construction will prioritize warehouse functionality, offering only limited office space to meet these evolving demands.

Figure 23 - K3851 office and K3852 Warehouse (From PERE firm)

6.4.1 Investment fund

The fund is classified as a low-risk, low-return investment fund, prioritizing income generation over capital appreciation. It falls within the core/core-plus category and is not specifically designated as a development fund, even though it occasionally engages in low-risk development activities. The investment fund maintains a diverse array of real estate properties within its portfolio, with a significant emphasis on the logistics sector (35%). Noteworthy is the absence of robust sustainability standards within the fund's operational framework. Originating from the United States, the fund predominantly concentrates its investments within the American geographical domain. Consequently, the fund's investor base primarily comprises institutional investors hailing from the United States.

6.4.2 Current building characteristics

The current building has the following general characteristics as shown in Table 7. There are also some specific characteristics:

- The current floor has large cracks everywhere, and the exact load capacity is unknown, within reasonable assumptions this will be a maximum of 20 KN/m2. This needs to be upgraded to 50 KN/m2 by fully replacing the floor.

- The roof and façade contain asbestos, this needs to be removed. The roof and façade also have a poor state and low thermal quality, this needs to be upgraded.
- The installations are outdated (end of lifespan) and in some cases not working, this needs to be replaced: air system, cooling system, emergency power, elevators, loading docks.
- The current building has an inefficient grid (10x7m and 10x26.3m) and a limited internal height (5.2 - 6m) due to the different build periods and use.
- The energy label is valid until 2027 and no BREEAM certificate is available.

Table 7 - General characteristics current building

Characteristic	Explanation
Plot size	34.300 m^2
Net Rentable Area	19.696 m^2 gross building area (GBA), 15.861 m^2 Lettable floor area (LFA)
Height	5 – 6 m
Parking spaces	350 cars
Year built	1930, 1975 and 2002

6.4.3 Description of the base case traditional development

A business case was previously submitted to the fund and was approved at that time, for the demolition of the current building and development of a new traditional logistic building. However, further development was halted due to concerns that the construction phase would result in a temporary loss of electricity connection to the building. Nonetheless, this initial business case can still serve as a foundational reference for our subsequent findings and outcomes. Appendix A shows the financial model of the base case scenario. The base case scenario is a traditional logistic development for K3851/52. Table 8 presents the key specifications for the base case traditional development of a new logistics warehouse.

Table 8 - Key specifications base case traditional development.

Key specifications	Explanation
Full address	Plot 3851/52
Ownership interest	Leasehold
Net Rentable Area	19.020 m^2 GBA / 18.057 m^2 LFA
GFA Warehouse	16.500 m^2
GFA Office	250 m^2
GFA Mezzanine	2.270 m^2
Height	11 meters
Site Area	27.300 m^2
Hold period	10 years
Efficiency	95% of GBA resulting in 18.057 m^2 LFA
Coverage ratio	61% of site area

6.4.4 Sensitivity analysis circular development

Because of the uncertain and fluctuating nature of rent and sales increases, as discussed in sub-section 4.2, a mathematical sensitivity analysis was conducted. This analysis helps us understand how changes in input values affect the final output (Christopher Frey & Patil, 2002). Two input parameters, namely the ERV and Yield, were identified for analysis. Minor adjustments to these inputs were established through a thorough review of existing literature and informal discussions with a development director associated with a PERE investor. These steps for the

ERV were -10%, +3%, +5%, +8%, +10%, +15%. For the yield these were: +0.10%, -0.05%, -0.10%, -0.15%, -0.20%, -0.25%. These steps gave a quick overview of how the output would change in relation to the input values. Further elaboration on these adjustments can be found in sub-chapter 7.2. The investment fund regarded the Internal Rate of Return (IRR) and Development Yield as the paramount output values in their assessment. These factors were therefore used as outputs.

6.5 Demarcation

Certain considerations have been disregarded during this research. These considerations were considered due to the existing challenges in the Dutch real estate market, which pose significant obstacles to completing developments. These challenges are briefly elucidated below.

Nitrogen

Currently, there is a lot of ambiguity and uncertainty about nitrogen and electricity in the Dutch real estate market. Nitrogen constraints have considerably impeded the development of both greenfield and brownfield projects. Furthermore, the lack of clear legislative guidelines in this regard has compounded the challenges, with anticipated resolution requiring several months. Consequently, in the context of this specific case study, the decision was made to exclude nitrogen-related factors from consideration.

Electricity

Moreover, the electricity grid in the Netherlands faces issues of overcapacity, making it exceedingly challenging to secure new connections. In the case of K3851/3852, the presence of an existing electricity connection obviates the need for acquiring a new one. However, during the site's redevelopment, the connection might be discontinued due to non-utilization of power during the construction phase. Consequently, the decision has been made to exclude electricity-related considerations from the analysis.

Financial

The research is about a feasible business case. The results are therefore limited to only a case which consist of a presentation and model (business case). Other additional pieces are not elaborated, such as a full building design and lease contract. Although, some thought has been given to this in broad terms for the development of the business case.

7

Results on a feasible business case for circular real estate development

Chapter 7 unveils the research findings, segmented into two parts (cycles). The first section (Section 7.1) looks at the different circular real estate design strategies. Section 7.2 continues with this information and looks at the challenges and considerations in the business case for circular real estate development. Section 7.3 investigates what the specific response is from an investment fund on a feasible business case. The chapter ends with giving the key findings from the results.

7.1 Circular real estate design strategies

The theoretical framework outlined multiple different design strategies for circularity. Although, it is important to note that there is considerable overlap between these design strategies, with a focus primarily on the product and material levels of circularity. However, it is worth mentioning that this study is oriented more towards circular building design strategies, which operate on a broader scale encompassing the entire building. The combination of the butterfly diagram of Ellen MacArthur Foundation (2013) (Figure 6) the 10R-Framework of Potting et al. (2017) (Figure 7), S-layers of Brand (1995) (Figure 8) and the four circular design strategies presented by Attia and Al-Obaidy (2021), let to a reduction in strategies.

The butterfly diagram shows two distinctive cycles, biological and material, it further already pertains a small set of R-principles. The 10R Framework is more detailed and prescriptive and works on the material cycle. Although due to the size in strategies it is decided to continue with the four strategies of Attia and Al-Obaidy (2021). The four design criteria/strategies for circular buildings have the most overlap with this study, however the strategies are slightly adjusted. A trade-off that has been made is to make the carbon footprint an overlying strategy together with the S-principles from (Brand, 1995). I narrowed the strategies down to four strategies: design-for-reuse (Reusable) [1], design with reused and recycled materials (reuse) [2], design with biobased materials (regenerate) [3], and design with minimal material use (refuse) [4]. The strategies with practical examples are shown in Appendix B and are shortly discussed below:

1. **Reusable (Adaptable and demountable):** In designing for reusable, it is assumed that a structure can cope with different future scenarios with different needs and requirements, which ultimately extends the life cycle. In this context, it is important that the design enables the harvest of the materials during and after the life cycle, without damage and reused at the highest possible quality.
2. **Reuse:** This strategy makes use of existing materials by reusing existing materials and recycled ones. Reuse preserves the inherent value of products and materials. Instead of discarding items after a single use, they are collected, refurbished if necessary, and reintroduced into the building.
3. **Refuse:** The primary goal of the "Refuse" strategy is to prevent waste and reduce the environmental footprint. This is achieved by refusing to use or produce materials,

construction, or processes that are known to be environmentally harmful or inefficient. Possible actions are checking whether structures, certain functions thereof, building components and products are needed, and eliminating unnecessary items, or designing more efficiently and optimally.

4. **Regenerate (biobased):** This strategy focuses on designing with as many building materials from renewable sources. A renewable resource is grown, naturally replenished, or naturally cleaned on a human time scale. Examples of renewable building products are shells, wood, and fibres.

7.2 Challenges and considerations of circular real estate

The focus group session focused on the different circular design strategies that were identified in the previous sub-section. During this session a discussion was held with a selected number of participants, shown in Table 5. The essence was on identifying the challenges and considerations in the business case for circular logistics development. The coding frame from Figure 22 was used to analyse the results of the focus group discussion. Because of the blended coding strategy some coding emerged from the data, which is also further explained below. The circular design strategies from Appendix B and the case description from sub-section 6.4 were shared with the participants before the focus group discussion as background information. Quotes of the participants are shown in the table and put between quotation marks; other text are observations and conclusions by the researcher on the discussion. The quotations are given a code and are referred to in the text. The full transcript of the single group discussion session is shown in appendix C.

7.2.1 Challenges

Cost

During the discussion session a trade-off was given about the different elements of cost associated with real estate: time, land cost, interest, hard cost, and soft cost (*C1*). Some of the cost remain constant while implementing circular strategies such as soft costs and interest. While it was noted that certain banks might offer slightly lower interest rates for highly sustainable buildings, this reduction usually amounts to just a few basis points, which does not offset the increase in hard costs.

Every circular design strategy presented to the group came with an associated cost increase, primarily the increase in hard costs. In the comprehensive discussion regarding the reuse strategy, it became apparent that this approach entails a considerable rise in construction expenses. Notably, these augmented costs predominantly manifest in the form of increased labour expenditures. The discussion highlighted the financial details, emphasizing the crucial role of labour costs in the overall implementation of the reuse strategy (*C2*). A similar issue was raised during the discussion on the reusable strategy. Even though it wasn't evident from the discussion that constructing a new, adaptable, and reusable building leads to a rise in hard costs, the fundamental concept of disassembling a building and reconstructing it elsewhere was perceived as financially burdensome (*C3*). Furthermore, it was highlighted in the discussion that with the reuse strategy some extra difficulties exist in the technical part of the construction, which also leads to a price increase (*C4*).

Discussing the renewable strategy, the same conclusion arose. When applying the renewable strategy to a building the investment cost and, in this case, the hard cost will increase (*C5*). In addition to the previous statements, it emerged that in the logistics real estate sector, prices are already at the lower end of the range. It is a sector where there is little margin (*C6*).

Table 9 - Quotations from discussion on Cost

Number	Quotations from discussion on Cost
C1	*"So, if you break out costs, you have time, land costs, interest, hard costs and soft costs." (development manager)*
C2	*"So, if you wanted to reuse, you are dismantling and rebuilding the whole hall with mostly the same material. This then becomes very much a cost-benefit where you are doing a lot of labour. Whereas almost any contractor will say throw it flat, build new and faster." (Construction director)*
C3	*"What killing is these days is what I actually just said that the labour rate is so high per hour that the moment I go to demount something and rebuild it, the cost adds up, unfortunately". (Construction manager)*
C4	*"In theory, you could put sections in between to raise the current roof. But then structurally there comes a moment problem because you literally have two pieces of steel that are going to connect with each other, so you then must connect them momentarily. Then it often becomes very expensive." (Construction director)*
C5	*"I did a little research on what do these different options cost as you move more towards wood. You just see there's a very big investment against building with wood." (Construction manager)*
C6	*"Logistics is just on the lower end of the range. We recently applied for a quotation for a facade: it was 67.5 euros per square meter. Then you have an insulated facade, which is really, cheap. If you then want to apply a wooden panel, it costs 175 euros per square metre. So, you are never going to apply that to a logistics hall." (construction manager)*

Returns

The returns are represented in the business case as rent paid by the tenant and an exit yield which is the estimated sale price at year x. As discussed in Chapter 4, circular real estate is associated with a rent and sales premium. However, the group discussion revealed that the rent premium was lower than anticipated, mainly due to tenant-related factors (*R1*). In addition, it was also seen as a challenge to achieve the imposed return for the investor while trying to achieve a sustainable building. The reason for this is within the logistics real estate market tenants are not yet ready to pay extra for a sustainable building (*R2*).

The rent a tenant is willing to pay directly influences the exit yield. However, due to the limited premium for sustainable buildings in the logistics sector, the exit yield remains relatively stable. When inquiring about the potential change in exit yield for a circular building, the answer was that this is not expected to change significantly for a circular building.

Table 10 - Quotations from discussion on Returns

Number	Quotations from discussion on Returns
R1	*"There is just a very big investment associated with circular construction, which I don't earn back anywhere? (Construction manager)*
R2	*"Well, you just don't necessarily see anyone in the market willing to pay more for a sustainable Logistics building." (development director)*

Technical difficulties with circularity

Technical difficulties with circularity emerged from the data during the discussion, where it was mentioned that significant technical challenges exist with circular construction particularly regarding the reuse strategy. These challenges took two forms: material degradation and the technical complexities associated with reusing materials. As previously noted, issues were encountered with reusing the steel structure due to moment problems. Additionally, materials

used in the building deteriorated over time, making it challenging to reuse them in a new construction project (*T1*).

Furthermore, because buildings have long lifespans, significant technological advancements have been made over the years. Consequently, many older buildings are no longer relevant or suitable for modern investments. It was further mentioned that these structures often have outdated and inefficient layouts, with lower roofs than today's standard (*T2, T3*). As a result, challenges emerge when attempting to implement the refuse and reuse strategies due to these inherent issues.

Table 11 - Quotations from discussion on Technical difficulties with circularity

Number	Quotations from discussion on Technical difficulties with circularity
T1	*"What you often see with the facade all around. That has naturally had the sun on it for years, so those finishes on that facade are often weathered decayed and just bad." (Construction director)*
T2	*"I think we did look at possibly raising the roof. But that does leave you with your inefficient grid." (Development manager)*
T3	*"There's a shed roof there, so that leaves you with relatively limited height. That's just not common these days to have that kind of stuff and you'd prefer to make it to today's standard". (Construction director)*

Timeline

In our discussion, it emerged that time is a crucial factor embedded within the cost considerations (*C1*). This is primarily related to the construction duration. The business case operates on the principle that completing construction within a shorter timeframe leads to increased profits, thanks to earlier rental income reflected in your DCF model. However, it's important to note that during the construction phase, you incur expenses such as leasehold costs without generating any revenue. The challenge arises when applying circular construction methods, which tend to be more labour-intensive. This approach may extend the construction timeline significantly. Consequently, this prolonged duration can adversely impact your financial model, creating a potential mismatch between projected revenue and actual construction costs (*TI1*).

Table 12 - Quotations from discussion on Timeline

Number	Quotations from discussion on Timeline
TI1	*"That is also good to take into account I think, the cost element includes time, so if you get a very fast construction time, you might make a few more millions." (Development director)*

Other challenges

Other challenges where shortly discussed such as residual values and leasing facades, but both were seen as something that could not yet be applied at this time or was seen as having too much risk by all the participants (*O1, O2*).

Table 13 - Quotations from discussion on Other challenges

Number	Quotations from discussion on Other challenges
O1	*"We'll never do that (leasing façade). It is owned by someone else in your property. Never." (Construction director).*

O2	*"Not much thought has been given to this yet (residual values). That's my aftertaste? It is just market forces, availability is still sufficient, so yes, why bother taking out those steel beams." (Construction director).*

7.2.2 Considerations

Market development

Considerable thought was dedicated to the future trajectory of the logistics sector. What surfaced during the discussion was the anticipation of substantial transformations in the logistics sector, alongside office and residential sectors, over the next 20, 30, and 50 years. Participants struggled to precisely predict the nature of these changes. Nonetheless, it was widely presumed that the arrival of AI and the rapid pace of technological advancements would serve as catalysts for this transformation. Additionally, within the Netherlands, challenges such as population growth and limited available land further complicates the sector. Logistics centres, being massive in size, significantly contribute to the limitation in land (*M1*). Suggesting an adaptable building as a potential solution for the future of the logistics sector, it quickly became evident that a logistics hall is naturally adaptable. Particularly the warehouse, which adhere to standardized grid sizes and heights consistent across the EU. This uniformity ensures that any tenant can easily integrate their operations within these spaces (*M2*). Although, it still does not account for the future changes we are going to see for the logistics sector.

Another development currently going on in the market, is the increasing demand from tenants for higher sustainability standards. This shift is driven in part by regulations, but tenants are also beginning to raise expectations concerning aspects such as a building's energy label. These companies also must report back to their investors who at some point expect more in terms of sustainability (*M3*). There were several references made to changes that are currently happening in the market, and that investors maybe still must acclimate to the high prices of sustainable building practices. It was however suggested that in a few years, people might question why this perspective on buildings wasn't adopted earlier. One problem this adds to is that the availability of materials is not yet great enough (*M4*).

Table 14 - Quotations from discussion on Market development

Number	Quotations from discussion on Market development
M1	*"Well, we can't necessarily visualise what that's all going to look like, but I do think logistics is going to see a very big change in how things are made and processed. But also, how the whole distribution network of the world is going to change" (Development director)*
M2	*"But I think logistics buildings are adaptable on the one hand, yes." (construction manager)*
M3	*"We need to have an energy label of above c for all offices by 2030. Ultimately, that will not only be a requirement from, in this case, the EU, but the user will also demand it more" (Development director).*
M4	*"That the problem of availability is not big enough. For example, if at some point you can no longer buy steel at all, then it may become more valuable to reuse, but now you can still buy steel anywhere. This is just market forces, availability is still plenty, so yes, why bother taking out those steel beams?" (Construction director)*

Sustainability

It was mentioned in the discussion that high sustainability standards have some benefits for the tenants. This adds to the already mentioned benefits in sub-chapter 4.1 (*S1*). Additionally, there was a remark made regarding the societal significance of the logistics sector. Frequently, this

sector is viewed negatively by residents and environmental groups due to increased traffic and its impact. With the construction of a highly sustainable circular building, this would allow to create more social support from residents. Chapter 4 already briefly touched upon the fact that currently investors are already very much looking at how to bring down a building's carbon footprint. Mainly because there are quite a few regulations coming up to tax the CO2 value of a building. But now you don't really see this reflected on the tenant side (*S2*).

Table 15 - Quotations from discussion on sustainability

Number	Quotations from discussion on Sustainability
S1	*"For example, a wooden building can improve some of the wellbeing of the office employee in the sense that it might lower sick leave" (Construction manager)*
S2	*"Because there is no tenant yet who says I want to have a CO2 positive building from you as a landlord" (Construction manager)*

Regulations

Regulations emerged from the data where the participants anticipated regulations concerning CO2 taxation are on the horizon. Although these changes are already underway, their impact hasn't been widely observed in the logistics sector as of now. However, there is a notable emphasis on reducing CO2 emissions in various initiatives today. This aspect is becoming increasingly significant and will undoubtedly require careful consideration soon.

Another potential area for change involves the pricing of land. Presently, developers frequently lease land from municipalities for development purposes. If the cost of this land could be reduced, it could significantly benefit your business case (*R1*). However, this aspect remains a substantial revenue source for municipalities, making it unlikely to be altered soon.

Table 16 - Quotations from discussion on Regulation

Number	Quotations from discussion on Regulation
R1	*"If you keep the land price high, and you can't charge a higher rent, then there is no business case" (Construction manager)*

Investor appetite

Investor appetite emerged from the data and was identified as another crucial condition in establishing a feasible business case. Particularly considering that sustainable development might not yield the same financial returns as conventional projects, it becomes imperative to understand investors' preferences. It's vital to determine what investors seek and how to effectively communicate the sustainability aspect to garner their interest and support (*IN1*). This aspect must be carefully considered when formulating the business case. There exists an opportunity to persuade investors through compelling arguments about the benefits of a highly sustainable building. Although challenges still exist with the financial part (*IN2*)

Table 17 - Quotations from discussion on Investor appetite

Number	Quotations from discussion on Investor appetite
IN1	*"Yes, then I think first investor appetite must be one of your conditions. Because I think that, that is the most determining factor, because if you say it doesn't count on financially, then that is the determining value of the investor and per investor that is slightly different, because they just have a different story" (development director)*

IN2	*"Business plan has to be creatively constructed to be able to have an argument of yes, we are going to build this whole thing with sustainable materials and that is very good for the environment, but financially it's a very difficult solution" (development manager)*

Tenant

Another crucial factor that emerged from the discussion is to consider the influence of the tenant on the development process. Currently, factors such as CO2 neutrality and other sustainability aspects are thoroughly evaluated within the investor community. However, when these factors are discussed with customers (tenants in logistics sector), they often do not express substantial concern or interest. Presently, tenants do not perceive these aspects as significant in their own business considerations. Consequently, they are less inclined to invest in fully circular buildings. The only aspect that somewhat influences this decision is the social responsibility of companies, although this factor holds less weight in the logistics property sector compared to other industries (*T1*). Although the discussion group expects that tenants are going to pay more for a sustainable building eventually (*T2*).

Table 18 - Quotation from discussion on Sustainability

Number	Quotations from discussion on Sustainability
T1	*"Yes, people are usually willing to pay more when they really feel things in their own little world and the customer doesn't feel it yet." (Development director)*
T2	*"But eventually tenants are going to pay more for a more sustainable building" (Development director)*

Strategic portfolio management

In a real estate investor's portfolio, certain assets consistently outperform others. Consequently, there might be an opportunity to develop a circular building with lower return performance, offsetting it by incorporating two or three highly lucrative assets within the overall portfolio. This concept emerged from the discussion, suggesting the feasibility of establishing a flagship building to enhance the overall portfolio performance (*ST1*).

During the discussion, it was highlighted that several real estate investors in the Netherlands are already addressing this issue. They achieve this by strategically offsetting underperforming assets, allowing them to demonstrate to investors that the overall portfolio is performing well.

Table 19 - Quotations from discussion on Strategic portfolio management

Number	Quotations from discussion on Strategic portfolio management
ST1	*"In theory, it could be interesting to have a kind of flagship building which is very sustainable but also costs more. To be able to say; look how sustainable we are, while the rest of the assets are all normal."*

7.2.3 Key takeaways for next cycle

In the realm of circular real estate, a host of challenges emerged, particularly in cost dynamics driven by circular strategies. These strategies, while aiming for sustainability, often lead to heightened expenses, notably in labor-intensive processes. Returns face complexities as rent premiums and investor returns prove challenging, especially in the logistics real estate sector. Considerations extend to market development, with anticipated transformations in logistics and a growing demand for sustainability standards. However, these aspirations encounter hurdles in

market adaptation and regulatory landscapes, such as the expected introduction of CO^2 taxation.

Navigating the investor landscape comes with its challenges, requiring alignment with preferences amid financial complexities. In this context, constructing compelling business cases becomes crucial. Finding the right investor, tuned in to the nuances of circular development, is seen as a potential solution. Tenant influence, presently showing limited concern for sustainability, is anticipated to shift toward a willingness to pay more in the future. Strategic portfolio management emerges as a potential solution, with flagship sustainable buildings offsetting underperforming assets, contributing to enhanced overall portfolio performance. Addressing these challenges and tapping into opportunities for sustainable development becomes paramount in navigating the landscape of circular real estate.

In summary, the consensus is that the financial feasibility of circular construction consistently falls below that of traditional developments. This remains the challenge presently, although participants anticipate a shift, as rent prices rise and costs eventually decrease in the future. Furthermore, considerations existed in investor appetite and strategic portfolio management, where because of financial problems, this could be a solution to still achieve a positive investment decision. The results of the single focus group are further used for the creation of a business case in the next sub-chapter.

7.3 Business case for circular real estate

This section builds on the challenges and considerations from the previous sub-section. A business case is created for logistic development in the Dutch real estate market. This case is presented to an investment fund to view their reaction to the business case. First a description of the case is given and a base case for a traditional development is identified. After which a business case is developed for a circular development opportunity for the described base case. This business case is then presented to the investment fund to see their response on a circular logistics development. The transcript from the presentation and meeting is shown in Appendix F.

7.3.1 Description of the traditional development base case

Appendix A shows the financial feasibility of the base case scenario. The base case scenario is a traditional logistic development for K3851/52. Table 20 again presents the key specifications for the base case traditional development of a new logistics warehouse.

Table 20 - Key specifications traditional development base case.

Key specifications	Explanation
Full address	Plot 3851/52
Ownership interest	Leasehold
Net Rentable Area	19.020 m^2 GBA / 18.057 m^2 LFA
GFA Warehouse	16.500 m^2
GFA Office	250 m^2
GFA Mezzanine	2.270 m^2
Height	11 meters
Site Area	27.300 m^2
Hold period	10 years
Efficiency	95% of GBA resulting in 18.057 m^2 LFA
Coverage ratio	61% of site area

7.3.2 Business case for circular real estate development

A business case for circular real estate was developed, employing identical specifications to the traditional development in the base case scenario. Moreover, this resulted in a business case for a circular logistic development that was comparable to the base case traditional development. As detailed in Chapter 5, this business case comprises a financial feasibility encompassing future financial assumptions, along with a presentation elucidating these assumptions. The financial assessments include a feasibility analysis and a DCF evaluation, both of which are presented in Appendix D. The presentation that was presented to the investment fund is shown in Appendix E.

Assumptions

The distinction between circular development and traditional development lies in the circular specification. Although briefly touched upon in the presentation, these specifications were derived from assumptions based on reference projects and the single focus group discussion (See reference project: Bleckman, 2023). This approach was adopted to provide the investment fund with an insight into the circular methodologies proposed for the development, as demonstrated in Figure 24.

Current Asset	Circular Approach	Circular strategy
Foundation	The current foundation located beneath the new circular redevelopment outline will be reused. Any foundation sections that cannot be reused will be recycled.	Reuse
Floors	The existing floor will have to be replaced by a geopolymer concrete floor (concrete without cement).	Refuse
Column Structure	Due to technical difficulties with the reuse of the steel structure the steel structure is recycled and replaced by a timber structure.	Reuse, renewable
Insulation	Isolation is used from biobased materials such ase isovlas (made from the short fibers from the stems of the flax plant).	Renewable
Facade	Exising glazing panels are reused. Facade consiting of Neolife wood composite.	Reuse, renewable
Finishes	Reused elements suchs as reused doors, floor tiles, and ceiling tiles.	Reuse
Layout	The layout of the circular development is completly made using standardized grid sizes and height. Resulting in a adabtable building for future reuse. This also guarantees that the current materials adhere to standard sizes, enabling their reuse at the end of their lifecycle and maximizing their residual value.	Reusable

Figure 24 - Detailed circular specifications for circular real estate development proposal (from appendix E)

In the preliminary study it was identified that there is a higher investment cost associated with circular real estate development. This was further substantiated during the discussion session where the cost was seen as one of the challenges of such a circular development. To account for challenges with circular development it was assumed that the hard cost increased by 15% in relation to the traditional development base case, this is a more significant increase than the discussed increase in chapter 4. Although, in collaboration with a construction director this assumption was made due to the increased labour cost that are associated with the reuse of materials as well as the increase in material prices due to the high-end circular materials. Figure 25 shows the key assumptions and returns that are related to the business case for a circular logistics development. Figure 26 shows the base case development in comparison to the circular logistics development, where it shows significant lower returns than the traditional development. It further shows that the circular development achieves a BREEAM Excellent certification.

Budget	Local		%
	Millions (€)	€ / m²	
Land/Site	€ 1.1	€ 41	4.7%
Hard Costs (incl. 3% contingency)	€ 17.3	€ 911	71.7%
Soft Costs	€ 1.38	€ 73	5.7%
Indexation	€ 1.95	€ 102	8.1%
DMF Fee (4%)	€ 0.89	€ 47	3.7%
Contingency TPC (2%)	€ 0.41	€ 22	1.7%
Leasing	€ 0.22	€ 11	0.9%
Leasehold	€ 0.00	€ 0	0.0%
Tenant Incentives	€ 0.00	€ 0	0.0%
Financing	€ 0.85	€ 45	3.5%
Total	**€ 24.2**	**€ 1,270**	**100%**

Dev't Assumptions		Exit Assumptions	
Hold period (yrs)	10	Exit Cap rate	5.00%
LTC	50.0%	Sale Price	€ 31.53 M
Avg. Interest Rate	6.50%	Sale Price /[sf/sqm]	€ 1,746
Avg. Lease-up Rent	€ 74.98	Asset/share deal	Share deal
Pre-leasing %	100%	Stab. Occupancy	100%

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (€ / m2)	€ 1,509	€ 1,746

Investment Returns	Unlevered (pre-tax)	Levered (pre-fees, pre-tax)	Levered (after fees, after tax)
CoC	4.22%	3.32%	3.32%
CoC (PC)	5.87%	5.64%	5.64%
IRR	8.86%	10.63%	9.23%
EM	1.87	2.10	1.90
Profit	€ 19.03 M	€ 14.43 M	€ 11.85 M

Reasons for Higher Development Costs:

At the moment we are expecting a price increase of 15% in relation to the base case due to:

- Increase in labor due to technical aspects with the application of circular construction
- Increased material prices due to high end sustainability materials

Figure 25 – Key assumptions and returns business case circular logistics development (from appendix E)

Base case traditional development

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (€ / m2)	€ 1,509	€ 1,746

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.82%	4.31%	4.31%
IRR	10.84%	13.61%	11.88%
EM	2.14	2.54	2.25

Key Facts

- Development cost € 21,3 M (€ 1,120 m²)
- BREEAM – Very good
- Normal Co2 production for traditional development

Base case circular development

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (€ / m2)	€ 1,509	€ 1,746

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.22%	3.32%	3.32%
IRR	8.86%	10.63%	9.23%
EM	1.87	2.10	1.90

Key Facts

- Total development cost € 24,2 M (€ 1,270 m²)
- BREEAM – Excellent
- Significant Co2 reduction using circular development specs
- Rent and sale premium associated with circular development, not accounted for in the business case.

Figure 26 - Return comparison base case traditional development vs base case circular development (From appendix E)

Investors commonly concentrate on these tables, using them as a basis for their investment decisions. To fully understand the reaction of the investment fund two sensitivity tables, coupled with scenario analyses on ERV and exit yield were set up. These scenarios tables were compared to the base case traditional development, allowing the fund manager to discern the differences in returns. The scenario analysis followed from the sensitivity analysis where it showed in the sensitivity analysis that a ERV increase of 8% and 10% (scenario 1 & 2) the returns already get closer to the traditional base case development, which is shown in Figure 27. The sensitivity tables and scenario analysis on the Yield are shown in Appendix E on slide 9, 11 & 12.

Base case traditional development

Base case development

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (€ / m2)	€ 1,509	€ 1,746

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.82%	4.31%	4.31%
IRR	10.84%	13.61%	11.88%
EM	2.014	2.54	2.25

Investment returns	Trended
Development yield	5.64%

Circular development – ERV scenario 1

Increased ERV with 8%

- Tenant is going to pay more due to its own sustainable financials' burdens (CO2 tax, ESG investing).
- The investors appetite of the tenants, desire high sustainability goals.

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.48 M	€ 1.91 M
NOI	€ 1.33 M	€ 1.52 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 29.53 M	€ 34.18 M
Exit Value (€ / m2)	€ 1,635	€ 1,893

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.63%	4.01%	4.01%
IRR	10.13%	12.56%	10.95%
EM	2.04	2.38	2.13

Investment returns	Trended
Development yield	6.11%

Circular development – ERV scenario 2

Increased ERV with 10%

- Where seeing significant ERV increases in office sector for BREEAM excellent buildings, which will translate to logistics.
- Social responsibility of tenant for sustainable building is expected.

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.51 M	€ 1.94 M
NOI	€ 1.35 M	€ 1.55 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 30.10 M	€ 34.84 M
Exit Value (€ / m2)	€ 1,667	€ 1,929

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.74%	4.18%	4.18%
IRR	10.44%	13.02%	11.36%
EM	2.08	2.45	2.18

Investment returns	Trended
Development yield	6.23%

Figure 27 - Scenario analysis on ERV circular development in comparison to base case traditional development (from appendix E)

7.2.4 Investment committee

De business case was presented (Appendix D & E) to the investment fund to discuss the potential positive investment decision. This presentation justifies the assumptions that were made during the feasibility. The feasibility and the presentation where send 24 hours in advance to the fund. The presentation took about 13 minutes and afterwards the fund asked questions on its feasibility.

As was shown in the previous section, the circular development achieves lower returns than the traditional development even if the ERV or Yield is increased by a significant amount. This was also the first point the fund responded on. They were seeing difficulties on a cost perspective and a returns perspective.

Cost vs Returns

In every proposal, the fund must justify these elevated development costs to their investors, facing challenges in explaining the 15% increase. This challenge is compounded by the persistent rise in interest rates, which they anticipate will continue for an extended period, further reinforcing the impact of this increase (*CR1*). Based on the proposed cost of the development they even challenge this 15% increase. They mentioned that they were expecting a higher increase in hard cost or even a higher number in contingencies. Especially since circular construction is relatively new, and they were not seeing any experienced contractors capable of resolving this issue. This led to inquiries about the guarantees these contractors could provide. If the increase remained within 15% - which was still perceived as a potential risk – there was potential, although due to the risk profile a higher contingency was expected resulting in a higher Capex spend (*CR2*).

Another point that was mentioned was the inquiry about green loans. They were seeing in the market that currently some banks give a discount on the loan because of a sustainable building, although, this is still small, so this would not result in a significant higher profit, it was something that in the future could be considered.

The investment fund also doubted the potential increase in ERV. The ERV analysis, showing an 8% and 10% increase, aligned with findings in the literature, if not slightly below the established benchmarks. Although, this data was mainly based on the office sector where there are now significant rent premiums associated with green buildings. While this trend has not yet been seen that much in the logistic sector (see quotation *R2* in Table 10), although it is expected. Furthermore, in combination with the rent premiums there was another point of the tenants being very cost conscious (*CR3*).

Table 21 - Quotations from investment committee meeting on Cost & Returns

Number	Quotations from investment committee meeting on Cost & Returns
CR1	*"In the current market environment where it's been kind of difficult to hit return targets and especially with the rising interest rate environment where we expect higher rates for longer, which developer is currently doing this today?" (fund manager)*
CR2	*"But do you think that it might make sense to underwrite a larger contingency considering this hasn't really been done before?" (fund manager)*
CR3	*"That would be if you're starting to price out some tenants you know based on the rents, it feels like some of these guys are pretty cost conscious and you know having the charge of you're really kind of limiting yourself in certain way". (fund manager)*

Investor appetite and strategic portfolio management

Something they mentioned is that the fund is sort of classified as an income fund, which means that they are looking at investments with a low risk profile while still achieving high returns. This is totally in line with the characteristics of a core/core-plus fund, shown in Figure 15.

They further don't look at capital appreciation, where they anticipate on the increase in value of the investment object. They have therefore shorter holding periods while still maintaining high returns. This comes directly form the investors who, based on these requirements, put money in the fund to invest. They, therefore, saw it as a difficulty to propose this investment to the board. Their conclusion on the business case was therefore: that the combination of income orientation and the current (lower) returns associated with the circular development compared to the traditional development result in it being difficult to see this as a positive investment decision (*IN1*).

The case study is part of Agro-food production park which is in the portfolio of the fund. The whole park is currently income producing and although the fund is not classified as a development fund (due to higher risk), they perform developments from time to time. Furthermore, a development, of what kind, is therefore always seen as a risky, and when it is also having lower returns while more capital is spent, it is difficult for the fund to see this as a positive investment decision. Despite achieving comparable returns in circular development compared to traditional development, the higher capital expenditure in the circular approach leads to the perception that traditional development is a more favourable investment decision to this fund.

Table 22 - Quotations from investment committee meeting on Investor appetite and Strategic portfolio management.

Number	Quotations from investment committee meeting on Investor appetite and Strategic portfolio management
IN1	*"Being an income fund, if you were to show kind of returns based on the teardown (demolish and new built) compared to the circular and you were showing a level of the current delta, I think between them, I think at this time, it's difficult". (fund manager)*

Marked development

Following the strategic portfolio management and investor appetite they mentioned that in the current market with the current market conditions (high interest rates, high cost) such a sustainable investment is still a bit down the road. Meaning that the fund expected that this sort of investments is in the future years to come.

The investment fund raised additional points that could potentially contribute to a feasible business proposal. Notably, they highlighted the increasing attractiveness of material reuse due to regulations imposed by both the Dutch government and local municipalities. Circular construction is gaining momentum, especially considering the numerous concerns regarding nitrogen emissions. However, given the lack of uniform implementation across municipalities and the absence of established regulations, these factors were not integrated into the current proposal. Furthermore, the fund emphasized the availability of subsidies as a potential solution for an unfeasible business case. Although these subsidies are highly specific and vary from year to year, the fund considered them as a potential remedy, even though they were not incorporated into the present business case.

This fund being an income warranted fund they saw other possibilities to use a different timeline for the development. Instead of a hold period which was now assumed at 10 years using a hold period of say, 5 years, would result in a higher equity multiplier, resulting in a more feasible business case. Although they did mention that they are looking at sustainable priorities however, they are not yet there to accept lower returns, they are now more and more looking at such possibilities.

7.3 Key findings

One notable discovery from the results is that, beyond the initial six identified conditions, three additional conditions prove crucial in influencing investment decisions: investor appetite, tenant considerations, and legislation. Both the presentation and the focus group discussion underscored the role played by these three conditions, in conjunction with the previously recognized six, in shaping the overall investment decision. Table 23 summarizes the results, illustrating each condition and its impact on the business case and positive investment decision for circular logistics development, the table also delineates the interconnections between these conditions.

The findings further show that the conditions that are related to a feasible business case are related differently than first was expected in chapter 5. The findings uncovered that even though a business case was structured with factors mirroring those of the traditional counterpart, the investment fund regarded this investment decision negatively. This was primarily attributed to conditions such as investor appetite, strategic portfolio management, and market development, which also in addition to the business case influence the alignment with the investment fund's preferences. This illustrates that certain conditions have an impact on both the business case

and the alignment with the fund, ultimately shaping the investment decision. Furthermore, the results indicated that not all conditions have equal influence, especially when considering circular logistics development. The findings showed that certain conditions such as cost, returns, investor appetite, strategic portfolio management, and market development exert more influence in that specific type of development. This was particularly noticeable in the investment committee meeting (sub-chapter 7.2.4), where the investment fund all touched upon these conditions. Figure 28 provides a schematic overview of how the conditions are related to a feasible business case for circular logistics development, constituting a supplement to the previously established relationship in Figure 20. The green marked conditions exert more influence on circular logistics development in comparison to the blue marked conditions.

Table 23 - Key findings results, showing the key findings of each condition and their relation to a feasible business case for circular logistics development.

Conditions	Under the conditions that:	Relation with other conditions
Cost	Cost should be minimized	Returns – *the cost should not exceed the expected returns of the project.*
Returns	Returns should be maximized	Cost – *The returns should achieve a feasible business case by exceeding the projected cost.*
Timeline	The timeline aligns with market conditions and investment fund preference. While stiving for a short construction period.	Returns – *Shorter construction periods and ERV period could result in higher returns in the business case.*
Sustainability	The sustainability aspects align with the investment fund's Environmental, Social, and Governance (ESG) principles. Creating long-term value for tenant and surrounding community and minimizing the negative impacts on the environment using circular design strategies. Ultimately achieving high building certificating.	Cost – It was found that t*he sustainability aspects of the project negatively influence the cost of the development.* Returns – *The sustainability aspects should result in a rent/sale premium which would result in higher returns.* Tenant – *The tenant should value the sustainability aspects so that they are willing to pay a premium.* legislation – *The sustainable aspects should fit the local legislation and even lead the current regulation while achieving specific subsidies.*
Tenant	Tenant should be willing to pay a rent or sale premium for associated circular building.	Returns – T*enant should have a positive influence on the returns.*
Legislation	The circular development should align with the current legislation. Subsidies are utilized, and regulations that favour the development are leveraged, providing it with an advantage over traditional approaches.	Cost – *The legislation should reduce the cost associated to the development using subsidies and adapting to future regulations.*
Investor appetite	Emphasize is laid on the investors associated with the investment	Cost – *Related to cost due to the capital that is invested by the fund.*

	fund and their orientation, be it income-focused or capital appreciation. Secondly, understanding the fund's classification, indicating its risk and return ratio, and tailors the development to align with this classification. If sustainability is prioritised over income orientation, the emphasis is on securing the right investor. It is, therefore, more closely associated with the eventual investment decision rather than the business case.	Returns – *Investor has certain level of returns it wants to achieve.* Timeline – *The timeline should align with the investor's strategy and fund timeline.* sustainability – *The sustainability should align with the investor preference.*
Strategic portfolio management	The circular development must align seamlessly with the existing portfolio of the investment fund. It is crucial to carefully assess whether the fund boasts a diversified portfolio wherein this circular development can be seamlessly integrated. This careful consideration ensures that the unique characteristics and objectives of the circular project harmonize with the broader investment strategy and goals of the fund. This condition further highlights the significance of alignment with the investment fund, exerting a major influence on the investment decision.	Investor appetite – *The proposed development should fit the current portfolio of the investment fund and investor.* Sustainability – *The level of sustainability is related to the strategic portfolio management of the fund. Where it searches for an optimum between sustainability and the reporting to the investors.* Market development – *The current market conditions should align with the current and future portfolio of the investment fund.*
Market development	The circular development aligns strategically with prevailing market trends, capitalizing on the opportunities they present. It is essential for the development strategy to remain agile, accounting for the dynamic landscape of current market risks.	Cost – T*he market development relates to the hard cost prices of the developments.* Returns – *The projected rent/sales premiums are related to the market development.* Timeline – *The timeline should align with the current market dynamics where it anticipates on current trends.* Sustainability – *The analysis and demonstration of the market are essential when there is a rising demand for sustainability.* Tenant – *It's crucial to assess the market to identify instances where*

		tenants are willing to pay extra for sustainable buildings.

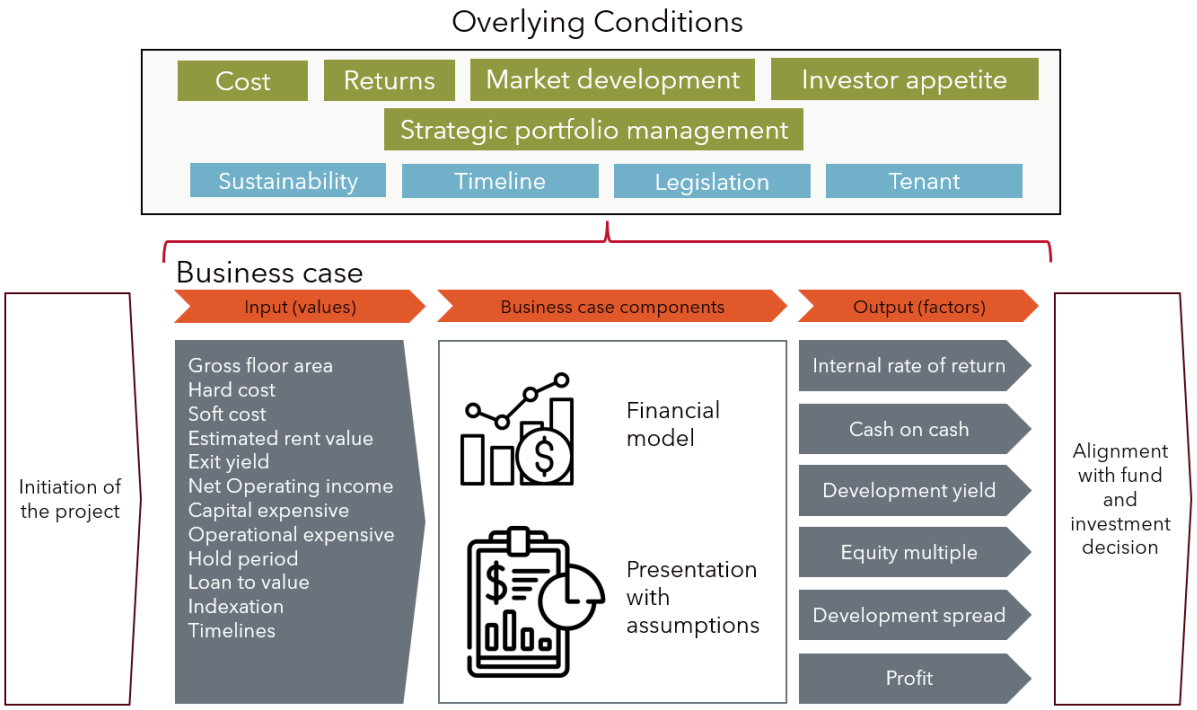

Figure 28 - Schematic overview of the relation between conditions and the business case for circular real estate development. Green marked conditions have greater influence on circular real estate development (own figure).

8

Discussion

The chapter initiates by contextualizing the research (Section 8.1). It starts by giving a reflection on the literature review and research design, whereafter it interprets the findings, unravelling their significance and implications within the context of the study. This section offers valuable insights into the meaning behind the data, enriching the reader's understanding of the research outcomes. Section 8.2 looks at the generalizability of the results. However, no study is without its limitations. Section 8.3 critically examines the limitations of the research.

8.1 Contextualisation of the research

Two methods for data analysis were used in this study, a single focus group discussion and a presentation. Both methods explored how to achieve a feasible business case and thus positive investment decision for circular real estate development. Whereas the single focus group looked more were the challenges and considerations where, the presentation looked more for validation from investors. This section gives a critical reflection on the literature review and research design, and the interpretations & implications on the research findings.

8.1.1 Reflection on literature review

The literature review explored various key variables relevant to the research, including circular real estate, real estate investing, the investment process, the added value of circular real estate, and the conception of feasible business case. Its purpose was to provide a comprehensive understanding of the topics incorporated into the research, offering insights into the relevant themes and concepts underpinning the study. In reviewing the literature, a comprehensive approach was taken, encompassing scientific, peer-reviewed, and grey, non-peer-reviewed sources. The inclusion of grey literature, while not without its limitations, contributes to the richness of the discussion. Grey literature, although not held to the same rigorous standards as peer-reviewed sources, served in this research as a valuable resource, providing insights that may not be captured within traditional academic channels. The grey literature consisted of master thesis found in the repository of Delft university of technology, and consultancy reports from consultancy firms operating in the Dutch real estate market.

The literature review and theoretical framework served as foundational background information during the results analysis. While not all information from these sources was directly incorporated into the results, they provided the researcher with a comprehensive background. This background proved invaluable in steering the focused group discussion and presentation, offering an extensive foundation for the research outcomes. Furthermore, in Chapter 5, conditions were derived through an examination of completed business cases in investment decisions. The relevant business cases were scrutinized to distil these conditions, all of which entailed positive decisions made within the timeframe of two years. It's noteworthy that the analysed cases pertained to the Dutch real estate market.

Reflecting on the literature review, it brought forth both strengths and weaknesses. A notable weakness lies in the review's depth on specific topics, potentially leading to the omission of crucial components relevant to the research design. Conversely, the review's strength resides in its expansive coverage of diverse topics. A comprehensive understanding of each subject was essential for guiding the research design, enabling a thorough exploration of the sub questions and, ultimately, addressing the main research question.

8.1.2 Reflection on research design

In this study, the employed research methodology was action research, blending theoretical insights with practical application. The data collection process involved the utilization of two qualitative methods: a single focus group discussion and a presentation delivered to an investment fund. The decision to employ action research was primarily driven by the exceptional opportunity within a PERE investor to conduct research on a real-life case study. This choice presented the optimal alignment with action research, enabling the fusion of theoretical understanding from the literature with practical insights in the creation of the case study. Moreover, practical insights from within a PERE investor were frequently incorporated throughout the research process. This was particularly evident in the formulation of the business case, wherein practical knowledge was combined with a theoretical foundation, creating a business case that integrated real-world applicability with academic precision.

The decision to conduct a single focus group discussion brought a level of richness to the data, as it allowed for in-depth exploration and interaction among participants. However, it is essential to note that the participants in this focus group all belonged to the same PERE investor. This factor introduces a contextual specificity that should be considered when interpreting the findings. While acknowledging the limitations associated with the participant composition and dynamics in the focus group discussions, the research design succeeded in capturing authentic insights into the circular real estate development process. The interplay between theoretical foundations and practical engagement contributed to a holistic exploration of the research questions.

8.1.3 Interpretations and implications of the Challenges and considerations

The findings revealed numerous challenges and considerations associated with circular real estate development. Financial aspects of the business case, such as costs, returns, technical difficulties related to circularity, and timeline, constituted most challenges, all of which are primarily manifested within the financial realm of the business case (conditions related to a feasible business case). In contrast, most of the considerations were related to the storytelling and presentation to the investors such as: market development, sustainability, regulation, investor appetite, tenant, and strategic portfolio management (conditions more related to investment decision).

A notable observation was the relation among the challenges, contrasting with the relatively distinct nature of the considerations. Challenges such as technical difficulties with circularity in circular construction and project timelines were related, both contributing to a higher initial investment and thus directly associated with costs. The condition returns, however, did not show a direct relation with timeline and technical challenges. Instead, they were inherently linked to costs. This intricate relationship between challenges was not as evident within the considerations. This could be attributed to the fact that considerations revolved more around future expectations, including market development, tenant preferences, and legislative changes, all of which were founded on assumptions, adding to the uncertainty within the business case (Schmidt, 2009).

New insights surfaced during the focus group discussions, highlighting previously overlooked conditions. Specifically, investor appetite, regulations, and tenant preferences emerged as crucial considerations, despite not initially being found as conditions in chapter 5. The overlooked conditions stemmed from the initial skepticism within the focus group regarding the feasibility of the business case in circular development. Consequently, discussions shifted towards exploring alternative avenues, emphasizing the importance of aligning with investors' interests (investor appetite), navigating government and municipal regulations (regulation), and understanding tenant willingness to pay higher rents (tenants). This indicates that there are alternative pathways to transform an initially unfeasible business case into a positive investment decision by reassessing other relevant conditions. These overlooked conditions were not unforeseen, but it was a possibility, considering that the examined business cases in chapter 5 were all feasible and led to positive investment decisions. This finding holds significant importance for the study, as it demonstrates that beyond the conditions initially identified in the preliminary study, there are additional conditions crucial for determining the feasibility of a business case for a positive investment decision.

The trade-off on cost that was identified during the focus group discussion was also found in the existing literature, where it was revealed that land and hard costs constitute the major portions of the overall project expenses (Islam et al., 2015). Furthermore, the conclusions on cost from the discussion session were like the ones found in the literature. The literature showed that the production and application of circular buildings is more cost intensive (Ghaffar et al., 2020; Ginga et al., 2020; Warren-Myers, 2012). This was further underscored during the discussion session, revealing that cost stood out as one of the major challenges in achieving a feasible business case.

Notably, it became evident that while costs increase with circular construction, the returns do not proportionally increase. This outcome underscores the current perspective of real estate investors, emphasizing cost and return metrics, which often leads them to perceive circular real estate as an unfeasible investment. Which adds to the statement of Mangialardo et al. (2018) from the problem statement, who found that real estate investors often fail to recognize the risk reduction inherent to integrating circularity's financial benefits.

8.1.4 Interpretation and implication of the response of investment fund

The findings revealed a promising opportunity for circular development within the Dutch real estate market, specifically in the context of a logistics warehouse. Notably, the business case indicated a 15% increase in hard costs due to elevated labour expenses and the use of high-quality materials related to circular construction. Moreover, this increase is more significant than the figures researched by Copper8 (2021), who estimated that this increase was about 1-7%. Although the 15% increase was derived directly from a construction director associated with a PERE investor, employing practical knowledge to enhance industry practices, aligning with the principles of action research outlined in chapter 6.

However, the business case also demonstrated that circular development yields lower returns than traditional development, primarily due to the heightened hard costs incurred. To address this, Mangialardo et al. (2018) findings regarding rent premiums associated with certified office buildings, a sensitivity analysis was conducted on the rent levels. This analysis, conducted in incremental stages, shows the impact on key investment attributes. The results indicate that incorporating a rent premium of 8-10% enables the circular development to approach comparable returns to those of traditional development. This showed that even with a small rent

increase, the investment attributes approach the same values as a traditional development, making the business case – based on the financial aspects – feasible. This same sensitivity analysis was conducted for the exit yield, although the investment fund, in addition to the single focus group, saw this as a risk and where not keen to change this number. Which is not in line with the found literature on valuations of the building where Leskinen et al. (2020); Vimpari and Junnila (2014) both saw significant increases in sale values with green buildings.

When presenting this business case to the investment fund it became evident that the investment fund did not see the proposal as a positive investment decision. Although, the business case did result in a profitable case, the increase in hard cost were seen as negatively influence on the investment decision. This all had to do with the classification of the fund. Where the fund is an income orientated investment fund. This perspective is inherently linked to the nature of this fund, characterized as a core/core-plus fund. Such funds typically focus on low-risk investments and, notably, avoid ventures involving developments altogether. The fund did not significantly prioritize the circularity and sustainability aspects of the development, underscoring the importance of investor appetite as a crucial condition. Additionally, their response primarily revolved around concerns related to risk factors due to the high circularity standards. The rise in costs, the increase in Estimated Rental Value (ERV), and the extended timeline were all perceived as risks, prompting further inquiries.

During the presentation, certain challenges and considerations surfaced from the focus group discussions. The fund's attention was drawn to the market development, where they perceived investments in circular and sustainable initiatives as more futuristic scenarios and as risky developments. A consideration that was also mentioned in the focus group. Additionally, the fund identified potential opportunities related to regulations, a point highlighted by the focus group, showing its significance.

The fund's reactive stance signifies that, given the current underwritings, they are unable to justify this decision to their investors. This underscores the paramount importance of investor appetite in determining a positive investment decision. To contextualize this further, it is essential to revisit the fundamental workings of a fund, as was discussed in sub-section 2.2.1 and Figure 10. Funds secure their capital primarily from pensions and insurance companies. In this specific case, the fund predominantly comprises American pension money, which, unfortunately, is not heavily involved in sustainable investments at present. This disparity poses a challenge for the fund, making it difficult to gain approval from their investors for ventures like the one in question. This doesn't imply that a different fund with an alternative classification (value-add, opportunistic) and different investors, would view this as a negative investment decision. There are funds specifically dedicated to investing in sustainable developments, showcasing diverse perspectives within the investment landscape. This result indicates that the preliminary study lacked sufficient consideration for the workings of an investment fund. It is now evident that this aspect is significantly more crucial than initially anticipated.

8.2 Generalizability of the results

This study aimed to address the overarching question: Under what conditions is there a feasible business case for real estate investors to make a positive investment decision on circular real estate development? This research aimed to address this central inquiry by focusing specifically on the logistics sector. The decision to narrow the scope to this industry was driven by the study's reliance on data, time considerations and the unique opportunity presented within a PERE investor to analyze a real-life case study.

The results of the study are therefore generated from one specific sector of the real estate market. Other markets, such as residential, retail, and office, were not considered during the findings. The generalization is subject to debate, highlighting the necessity for caution in generalizing the findings to encompass the broader spectrum of real estate sectors. This observation is echoed in the existing literature, where substantial disparities exist between rental and sales premiums for circular properties (Leskinen et al., 2020). Notably, the residential and office sectors exhibited more pronounced rent premiums in contrast to the logistics sector. Additionally, the single focus group discussion underscored the distinctive nature of the logistics sector, characterized by relatively lower prices compared to other sectors (see Table 9 Quotation C6), a point reiterated multiple times during the discourse.

However, the presentation to the investment fund highlighted those conditions such as cost, returns, investor appetite, strategic portfolio management, as well as market development, were identified as pivotal conditions for circular logistics development. These conditions bear significance across the spectrum of real estate developments, underscoring the generalizability of the results to other sectors. Moreover, the recognized conditions were derived from a combination of literature, informal discussions, and approved investment decisions from the total real estate sector. Consequently, these identified conditions did not exhibit distinct characteristics unique to the logistics sector, contributing to the generalizability of the outcomes. An additional aspect affirming the universality of the results is the fund's broad focus that extends beyond logistics. Despite logistics comprising the largest segment of their portfolio, the fund approaches this business case and investment meeting with a global perspective. This broader outlook reinforces the generalizability of the findings, indicating that the identified conditions transcend specific sectors and are pertinent to a more comprehensive evaluation of real estate investments. The prominence of these conditions underscores their universality and reinforces the applicability of the findings beyond the specific context, emphasizing their relevance and transferability throughout the broader real estate industry.

8.3 Limitations

During the study some limitations of the research were already discussed in the previous sections and throughout the research. Understanding and acknowledging these limitations is crucial for a nuanced interpretation of the research outcomes. The limitations of this study are therefore summarized below.

- **Literature Review Scope:** this study acknowledges a limitation in the scope of the literature review. The review was constrained by the absence of specific components, notably financial decision-making, and PERE investor dynamics. While the literature study extensively covered circular real estate and investment decisions, the omission of a detailed examination of the research variables employed in the results suggests the need for a more comprehensive exploration of these aspects. This limitation implies that some valuable contributions may have been overlooked, which could have added significant depth to the research.
- **Action research as a methodology:** The participatory approach inherent in action research introduces challenges in maintaining the validity and reliability of its findings. The absence of a standardized process and different participation groups impact scientific accuracy.
- **Subjectivity and bias:** The researcher's viewpoint on circularity, investments and active participation in action research could introduce subjectivity and bias. The researcher's personal beliefs, perspectives, and experiences may shape the research process and outcomes.

- **Participants single focus group:** The participants in the single focus group discussion were exclusively from the development team of the same PERE investor. Exploring a distinct focus group session with a different set of participants might have uncovered distinct findings regarding the challenges and considerations in the business case compared to those derived in the current study. An alternate approach could have entailed arranging a second focus group discussion involving participants from an alternative PERE investor. Moreover, incorporating experts from various real estate domains, such as a circular economy specialist, sustainability expert, fund manager, or investor, in this discussion could have enriched the perspectives. This, in turn, might have offered varied insights into the presentation of the investment fund.
- **Single focus group discussion:** Limitations arise in focus group discussions as a result of the group dynamics. In this study, participants were exclusively from the same PERE investor, and a few of their managers were present during the discussions. This circumstance could potentially have affected certain participants, impeding their ability to candidly express their opinions. Additionally, dominant voices in the discussion might have prevented other participants from fully sharing their viewpoints. These dynamics could have impacted the depth and diversity of opinions expressed within the focus group sessions.
- **Demarcation:** In the case study, certain demarcations were established to attain a more generalized perspective on the results. However, it is worth noting that some of these demarcations, particularly those related to nitrogen and electricity, surfaced during the discussions, and might have contributed valuable insights to the findings. Despite their exclusion, these aspects could have been utilized in shaping the outcomes of the study.
- **Specific case study and sector:** The case study highlighted several limitations, prominently among them the restricted focus exclusively on the logistics real estate sector. The literature and ensuing discussion underscored the distinctiveness of the logistics sector compared to others. Exploring alternative sectors, such as the office and residential markets, might have unveiled opportunities for higher returns, particularly given the potentially elevated rent premiums associated with circular practices in those sectors. Had this led to an improved business case, the fund would have approached this circular development with a different perspective. Considering alternative sectors might have introduced a broader perspective, offered a more comprehensive understanding of the subject matter, and potentially enriched the study's outcomes with a more nuanced exploration of various real estate dynamics.
- **Different fund:** The study's scope was restricted to a particular investment fund (core/core-plus), thereby limiting its generalizability. This fund, which leans towards income orientation and sources capital from American pension funds, may not have been actively involved in sustainable initiatives. In contrast, a different type of fund, such as a value-add fund that is more inclined to embrace risk in their developments, would likely have approached this proposal differently. Due to their distinct perspective on development, certain conditions might not have been raised in the same manner as they are now.
- **Different perspective:** Because the study approached the topic from the viewpoint of a PERE investor, certain potential solutions like residual values and leasing facades were promptly dismissed. If viewed from the standpoint of different investors or developers, the outcomes might have varied. This could have been incorporated into the business case, prompting the exploration of a more comprehensive solution.

9

Conclusion and recommendations

This chapter shows the study's findings as clear conclusions. It starts by answering the research questions and sub-questions directly (Section 9.1). The main research question and its components are addressed comprehensively, providing precise insights. Looking ahead, the chapter provides concise recommendations. For academics, it suggests future research directions and for practical applications, it offers straightforward strategies and best practices (Section 9.2.1).

9.1 Answers to research questions

This study aimed to answer the conditions that are needed to achieve a feasible business case for real estate investors to make a positive investment decision for circular real estate development. To achieve this objective, five sub-questions were studied, each contributing to the overall goal. These sub-questions and their corresponding conclusions are elaborated upon below.

9.1.1 A positive real estate investment process

What is the existing investment process currently used by real estate investors to achieve a positive investment decision?

The current investment processes utilized in the real estate investment process to achieve a positive investment are dynamic and multistage, reflecting the complexity of the industry. However, it was found that standardization is lacking in the real estate sector, primarily because of the industry's diverse and intricate nature. Various studies have identified common phases within the development process, including initiation, feasibility, commitment, construction, management, and end-of-life, all of which are integral parts of the investment process. Throughout this process the involvement and influence fluctuate of the investor, ultimately resulting in the investment decision being made during the first three phases of initiation, feasibility, and commitment. Initiation marks the identification of opportunities, while feasibility, especially focuses on financial viability amid market uncertainties, such as construction prices and rent returns. The feasibility phase also considers fund compatibility and strategic timelines, crucial factors often overlooked. Commitment involves thorough due diligence, finalizing financial evaluations, securing funding, and establishing crucial agreements with stakeholders. These phases collectively form a comprehensive framework guiding investors from opportunity identification to project commitment, ensuring informed and strategic real estate investments.

The positive investment decision hinges on the investment fund's classification (core, core-plus, value-add and opportunistic) and evaluation of risk and return. The fund strives for an optimal balance, aligning with its objectives, risk tolerance, and investment timeline. This delicate equilibrium is visualized through the risk and return curve, closely tied to the fund's classification perspective. Throughout the investment journey, financial feasibility, risk, and return are continuously assessed. When all these aspects align harmoniously with the investor's criteria, the investment decision is seen as positive.

9.1.2 Added value of circular real estate

What is the added (financial) value of circular real estate development?

The results demonstrate that circular real estate offers numerous advantages in terms of both sustainability and financial aspects. Importantly, these benefits are evident across the entire development process. High sustainable buildings demonstrate significant environmental benefits by reducing resource consumption, waste, and greenhouse gas emissions. Additionally, circular buildings offer flexibility, reduce vacancy, create employment opportunities, and contribute to social and economic growth. Moreover, green certifications like BREEAM and LEED recognize the holistic value of circular design, emphasizing environmental, social, and health factors. This highlights the vital role of circular construction in promoting sustainability on multiple fronts in the construction industry.

The financial advantages of circular development span various stages of the process. Despite the initial higher investment compared to traditional methods, circular development yields several benefits. The study highlighted the possible effects on operating, maintenance, and replacement costs, as well as adaptability and demount ability of circular materials, potentially reducing operational expenses. Higher certifications lead to significant rent and sales premiums, with social responsibility and employee welfare contributing to these premiums. Additionally, circular construction's demountable nature allows residual materials to retain value, enhancing the project's overall financial benefits.

9.1.3 Feasible business case

What factors and conditions lead to a feasible business case for real estate development?

As discovered, the business case comprises a financial model and a detailed presentation or report outlining future assumptions reflected in the model. It is influenced by a combination of conditions and factors, working together to establish the feasibility of a development. The findings suggest that the conditions are related to cost, returns, timeline, market development, sustainability, and strategic portfolio management. The feasibility of the business case is determined by the interaction between conditions and factors. Factors represent quantifiable elements of risk and return, typically expressed as investment attributes within the financial model. Conditions, on the other hand, gauge the extent to which these factors impact the overall investment decision.

The business case consisted of a financial model showing a detailed financial calculation of the investment. Within the financial model multiple values are presented that are influenced by the overlying conditions. These values are used to calculate and come to the different factors. The factors are investment attributes and shows quantifiable outputs where investors are keen for. The study found that the following factors are of importance for the investor: Internal rate of return, Cash on Cash, Development yield, Equity multiple, and development spread.

It was found that, a business case is seen as feasible when the following conditions align with the investor risk and return spectrum minimize the cost, maximizes the returns, adhering to timelines in sync with market demands and available financing, proactive market adaptation while avoiding risky trends, long-term value creation through sustainable practices benefiting both the environment and local community and the development integrates seamless into the existing real estate portfolio, ensuring diversification that aligns with strategic goals.

9.1.4 The challenges and considerations in the business case

What are the challenges and considerations in the business case for a circular real estate development?

In conclusion, the adoption of circular construction methods presented formidable challenges. Cost considerations are intricate, with significant increases in labor expenses, especially concerning the reuse and renewable strategies. Returns on circular buildings, including rent premiums and exit yields, face limitations due to market dynamics, hindering financial viability. Technical hurdles emerge from material degradation and complexities associated with reusing materials, compounded by outdated building layouts, and uncertain future developments. Additionally, circular methods often extend construction timelines, impacting revenue projections.

The considerations in the business case for circular real estate development encompass various complex factors. Market development is marked by the anticipation of significant transformations in the logistics sector due to advancements in technology, although the precise nature of these changes remains uncertain. Adaptability in building design, driven by standardized grid sizes, offers a potential solution, yet challenges persist in foreseeing future sector shifts. Sustainability standards, driven by regulations and tenant demands, are evolving, impacting both societal perceptions and investor strategies. Anticipated CO^2 taxation regulations and the potential reduction in land pricing by municipalities further complicate the landscape, demanding careful financial planning.

A topic explored in the focus group discussion revolved around investors, specifically focusing on their appetite and portfolio composition. Understanding investor preferences and creatively constructing business plans are crucial, given the disparity between sustainability benefits and financial viability. Finding the right investor was seen as one of the solutions to achieve a positive investment decision. Lastly, strategic portfolio management allows for the construction of circular buildings, offset by high-performing assets within the portfolio, a strategy already employed by forward-thinking real estate investors in the Netherlands.

9.1.5 A business case for circular real estate

What are the specific responses of real estate investors when presented with a business case for circular real estate development?

In conclusion, the response of the investment fund to the business case for circular real estate development revealed several critical factors influencing their decision-making process. The Fund, representing an income-focused fund with a low-risk profile and a preference for short holding periods, expressed apprehension about the higher development costs associated with circular construction. The 15% increase in hard costs raised concerns, especially given the lack of experienced contractors and the uncertain development market marked by rising interest rates. The fund also questioned the potential increase in rental income (ERV), considering the cautious nature of tenants and the limited evidence of significant rent premiums in the logistics sector. Additionally, the fund expressed scepticism about the feasibility of presenting circular development as a positive investment decision, given the current market conditions and the fund's income-oriented classification.

The discussion also highlighted potential mitigating factors such as regulatory incentives, subsidies, and the possibility of adjusting the development timeline to make the circular approach more financially viable. Despite these considerations, the fund emphasized the challenge of reconciling the higher costs and potential lower returns associated with circular development, especially in comparison to traditional teardown and rebuild methods.

Therefore, the investment fund response to the circular real estate business case underscores the complexity of integrating sustainable practices into real estate investments. While there is growing interest in sustainable initiatives driven by regulatory changes and environmental concerns, the investment funds appetite for these projects is significantly influenced by risk tolerance, cost considerations, and expected returns. As the market evolves and sustainable practices become more financially viable and socially accepted, investors may become more receptive to circular real estate development. However, now, these initiatives face significant hurdles in convincing income-focused investors to embrace this innovative approach.

9.1.6 Main research question

The research aimed to give an answer to the following research question:

Under what conditions is there a feasible business case for real estate investors to make a positive investment decision on circular real estate development?

In conclusion, the study revealed six critical conditions that significantly impact a feasible business case for circular real estate development: cost, returns, timeline, market development, sustainability, and strategic portfolio management. Additionally, during the results investor appetite, regulation, and the tenant preferences were identified as additional conditions for achieving a feasible business case. These nine conditions interconnect in complex ways, involving various relationships, inputs, outputs, and levels of importance. It was further identified that some conditions had more influence on the business case (cost, returns, timeline, sustainability, tenant, and legislation) and some, in addition to their impact on the business case, also influenced the alignment with the investment fund decision (Market development, investor appetite, and strategic portfolio management).

The findings highlighted unique aspects and relationships of each condition concerning the business case and investment decision. In essence, each condition influences the business case and investment decision. Although, their key lies in their harmonious interplay, collectively guiding the investment decision. The findings in the results highlighted the increased importance of certain conditions in circular developments as opposed to traditional ones. The results underscored that, in the context of circular real estate development, particular conditions are not only considered more important but also wield a significantly greater influence on the business case and investment decision. Notably, conditions such as cost, returns, investor appetite, market development, and strategic portfolio management emerge with heightened significance in shaping the investment decision process for circular real estate development. Therefore, under the following conditions there is a feasible business case for real estate investors to make a positive investment decision for circular real estate development:

- **Cost vs Returns:** In the realm of circular real estate development, the viability of the business case hinges on fundamental conditions – cost and returns. Essentially, achieving the optimal balance by minimizing costs and maximizing returns is imperative for ensuring the overall feasibility of these projects. However, considering the anticipated rise in investment costs due to circular construction, this should be balanced with increased returns. The key is to maintain a strong connection between costs and returns, ensuring that overall profitability remains consistent compared to its traditional counterpart.
- **Investor appetite:** The results suggest that securing an investor open to accepting a slightly lower profit, notwithstanding the elevated initial costs linked to the development, results in a positive investment decision. This underscores the

significance of aligning investor expectations with the project's financial outcomes, fostering a mutually beneficial partnership. Such strategic collaborations, where investors demonstrate a nuanced understanding of the project's long-term potential through circular development, play a pivotal role in shaping positive investment decisions for circular real estate development.

- **Strategic portfolio management:** The success of circular development critically relies on its seamless alignment with the existing portfolio of the investment fund. It is imperative to conduct a thorough assessment of the fund's portfolio diversity, ensuring the seamless integration of this circular development. The circular development should harmonize effectively with the broader investment strategy and goals of the fund.
- **Market development:** As was mentioned numerous times, the investment decision heavily relies on the investor's evaluation of risk and return. Understanding the prevailing market conditions and identifying existing trends are pivotal in determining the feasibility of a positive investment decision. Should an investor perceive uncertainties or risks within the current development market context, especially concerning circular development opportunities, it may impede the ability to make a positive investment decision.

9.2 Recommendations

Based on the discussion, limitations, and conclusion of this research the following recommendations for future research are given:

- This study presented a business case to a core/core-plus fund. Subsequent research could explore various categorized funds (core, core-plus, value-add, and opportunistic), thereby adding an additional dimension to the study.
- Applying the study methodology across the entire real estate market. By extending the research to encompass other sectors such as residential and office, a comprehensive analysis can be conducted. This approach would provide valuable insights into potential sector-specific variations, showing a deeper understanding of the dynamics within different segments of the real estate market.
- During the study it became apparent that understanding the operation of an investment fund is far more complex than first thought in this study. Future research could explore the dynamics, subjectivity and political strategies within a real estate investment fund related to sustainable investments.
- Potential other benefits that arise with circular construction could enhance the financial feasibility of a circular development. These could include a potential reduction in operating costs, or leasing materials.
- This study used a hard cost increase of 15%, this number was based on practical knowledge from a construction director working within in PERE investor. Future research could elaborate on the increase that is associated with circular construction, which is currently lacking. This could help to make better investment proposals due to more accurate investment increases.

Because of the action research methodology, the study incorporated a wealth of practical information. This approach resulted in a highly practical answer that is directly applicable in real-world scenarios. However, in conjunction with the acknowledged limitations, certain recommendations for practical implementation are provided below:

- The findings indicated a negative investment decision, as the investment fund was unwilling to compromise on higher cost for circular development. A possible recommendation is to establish a dedicated sustainable impact investment fund

focusing exclusively on premium sustainable and circular real estate projects. This fund should fall under the category of a value-add/opportunistic fund, emphasizing a significant focus on capital appreciation and development initiatives. Especially, since there is a growing trend among insurance companies and pension funds towards sustainable investments. Some regions even consider directing pensions solely towards sustainable practices, potentially supporting the prospects of this specialized fund.

- Another notable recommendation arising from the study is that there is currently an ample supply of materials for new developments. Consequently, it may seem illogical to opt for building with reused materials or adopting a circular design methodology instead of using new materials. Introducing regulations mandating the reuse of a specified quantity of materials for each real estate development could be considered.

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Appendix

Appendix A: Base case traditional development - financial feasibility.

Appendix B: Focus group preparation – Circular strategies.

Appendix C: Transcript single focus group discussion (Dutch).

Appendix D: Circular logistics development - financial feasibility

Appendix E: Presentation investment fund

Appendix F: Transcript presentation investment fund.

A

Base case traditional development - financial feasibility

Asset Assumptions

Unit	New DC
Land	27.300
Coverage Ratio	60%
WH	16.500
Office	250
Office as % of WH	1,5%
Mezz	2.270
Mezz as % of WH	13,8%
Parking units	0 units
Solar	13.200
Value PSM	135,49023

Dates

Description	Start (BOM)	End (EOM)	Duration m
Price date	1 Jun 2023		
Cash Flow Start/Acq	1 May 2023		
Construction	1 Mar 2024	31 Aug 2025	18
ERV	1 Sep 2025	30 May 2033	
Hold period (y)	1 May 2023	30 May 2033	10
Indexation leasehold	1 Mar 2024	31 Aug 2025	18
Indexation construction	1 Jun 2023	30 Nov 2024	18
Indexation rent	1 Jun 2023	31 Aug 2025	27

Revenue

Revenue Assumptions

Item	% of income	GFA	Efficiency	LFA or #	ERV PSM	ERV/Month	ERV/Year
Warehouse	85%	16.500	95%	15.675	79,0	103.194	1.238.325
Office	2%	250	90%	225	130,0	2.438	29.250
Mezzanine	6%	2.270	95%	2.157	40,0	7.188	86.260
Total ERV (today)	**93%**	**19.020**	**95%**	**18.057**	74,98	**112.820**	**1.353.835**
Solar	7%	13.200	100%	13.200	7,3	7.999	95.993
Total ERV incl. Solar (today)	**100%**	**19.020**	**95%**	**18.057**	**80,3**	**120.819**	**1.449.828**

Revenues	%	Months	PSM	Total	
ERV incl. Solar (today)			80	1.449.828	
Indexation ERV (incl. Solar)	2,50%	27	4,6	82.830	
ERV gross of LH (at completion)				**1.532.658**	
Leasehold Cost (today)	4,50%		6,10	166.450	11,5%
Indexation Leasehold	2,50%	27	0	4.161	
ERV net of LH (at completion)			**75**	**1.362.047**	
Operating Expenses	10,00%		8	136.205	
NOI (at completion)			**68**	**1.225.842**	
Gross exit yield (net of LH)				5,00%	
Gross income from Sale			**1.509**	**27.240.942**	
Closing Costs	0,92%		14	250.000	
Net income from Sale			**1.495**	**26.990.942**	

Costs

Costs (at start construction)			
Land Prep		**PSM**	**Total**
Demolition (incl. asbestos)		39,5	1.078.785
Land Preparation		1,8	50.000
Total Land Prep Costs		**41**	**1.128.785**
Hard Costs		**PSM**	**Total**
Foundation		525,0	9.985.663
Primary construction: Foundation, structure, Fa		-	incl
Secondary construction		-	incl
Finishes		-	incl
External area		-	incl
Installation systems		101,3	1.926.250
Utilities		9,5	180.000
Other		-	0
Total Hard Costs		**635,7**	**12.091.913**
Soft Costs GC		85,1	1.619.536
Additional costs (solar)		48,2	916.667
Contingency HC	3,0%	23,1	438.843
Total Hard Costs incl. Cont.		792,16	**15.066.959**
Soft Costs	**%**	**PSM**	**Total**
Leges	2,70%	21,4	406.808
Main advisors	5,0%	39,6	753.348
Other		2,6	50.000
Total Soft Costs		**64**	**1.210.156**
Indexation	3,00%	89	1.698.469
Contingency (TPC)	2,0%	19	359.512
DMF Fee	4,0%	41	778.555
Total Construction Costs		**1.064**	**20.242.436**
Other Development Costs	**%**	**PSM**	**Total**
Leasing Costs	15,0%	11	217.474
Leasehold costs		0	0
Tenant Incentives		0	0
Financing Costs	6,25%	45	850.021
Total Development Costs		**1.120**	**21.309.930**
Land Acquisition Costs	**0**	**0**	**0**
Closing Costs	0	0	0
Total Project Costs	**0**	**1.120**	**21.309.930**
LFA	18.057	1.180	21.309.930

Profit

Profit Analysis	# of Months	PSM LFA	Total
ERV gross of LH (at completion)	27 months	85	1.532.658
ERV net of LH (at completion)	27 months	75	1.362.047
NOI (at completion)	27 months	68	1.225.842
Gross exit yield (net of LH)			5,00%
Gross income from Sale		1.509	27.240.942
Net income from Sale		1.495	26.990.942
Total Project Costs		1.180	21.309.930
Profit on Sale (pre-tax)		315	5.681.011
Tax on Profit	25,8%	81	1.465.701
Profit on Sale (post-tax)		233	4.215.310

Gross Development Yield		
Untrended Development Yield	**7,39%**	*ERV incl. Solar*
Gross exit yield (net of LH)	5,00%	
Untrended Development Spread	239 bps	
Trended Development Yield	**7,19%**	*ERV gross of L*
Gross exit yield (net of LH)	5,00%	
Trended Development Spread	219 bps	
Development Yield (net of leasehold)		
Development Yield	**6,54%**	*(ERV incl. Sola*
Gross exit yield (net of LH)	5,00%	
Untrended Development Spread	154 bps	
Trended Development Yield	**6,39%**	*ERV net of LH*
Gross exit yield (net of LH)	5,00%	
Trended Development Spread	139 bps	
Net Development Yield		
Trended Development Yield	**5,75%**	*NOI (at comple*
Net exit yield	4,50%	*NOI (at comple*
Trended Development Spread	125 bps	
Profit on Cost (pre-tax)	**26,66%**	
Profit on Cost (post-tax)	**19,78%**	

Sensitivity analysis on PoC (post-tax)

		ERV PSM						
		-10%	0	+3%	+5%	+8%	+10%	+15%
	19,78%	69,50	74,98	77,23	78,73	80,98	82,48	86,22
-10%	712,9	21,05%	28,96%	32,21%	34,37%	37,62%	39,78%	45,18%
0	792,2	12,57%	19,78%	22,74%	24,72%	27,68%	29,65%	34,58%
+5%	831,8	8,87%	15,78%	18,62%	20,51%	23,34%	25,23%	29,95%
+10%	871,4	5,47%	12,10%	14,82%	16,64%	19,36%	21,17%	25,70%
+15%	911,0	2,34%	8,71%	11,33%	13,07%	15,69%	17,43%	21,78%

Sensitivity analysis on PoC (post-tax)

		ERV PSM						
		-10%	0	+3%	+5%	+8%	+10%	+15%
	6,39%	69,50	74,98	77,23	78,73	80,98	82,48	86,22
-10%	712,9	6,48%	7,02%	7,23%	7,38%	7,60%	7,74%	8,11%
0	792,2	5,91%	6,39%	6,59%	6,72%	6,92%	7,06%	7,39%
+5%	831,8	5,65%	6,12%	6,31%	6,44%	6,63%	6,76%	7,07%
+10%	871,4	5,42%	5,87%	6,05%	6,18%	6,36%	6,48%	6,79%
+15%	911,0	5,21%	5,64%	5,82%	5,93%	6,11%	6,23%	6,52%

Date		start	duration (months)	end	***Total***	**01/05/2023 31/05/2023**	**01/06/2023 31/05/2024**	**01/06/2024 31/05/2025**	**01/06/2025 31/05/2026**	**01/06/2026 31/05/2027**	**01/06/2027 31/05/2028**	**01/06/2028 31/05/2029**	**01/06/2029 31/05/2030**	**01/06/2030 31/05/2031**	**01/06/2031 31/05/2032**	**01/06/2032 31/05/2033**
Hold Period	10,00 years															
Year	01/05/2023					0	1	2	3	4	5	6	7	8	9	10
Hold	10					0	1	1	1	1	1	1	1	1	1	1
Exit	31/05/2033					0	0	0	0	0	0	0	0	0	0	1
Land Costs																
Purchase Price (based on RLV)	-	01/05/2023			-	-	-	-	-	-	-	-	-	-	-	-
Closing Costs (incl DD)	-	01/05/2023			*-250.000*	-250.000	-	-	-	-	-	-	-	-	-	-
RETT	0,0%				-	-	-	-	-	-	-	-	-	-	-	-
VAT Due at Closing (if applicable)	0,0%	-			-	-	-	-	-	-	-	-	-	-	-	-
Land Costs					***-250.000***	**-250.000**	-	-	-	-	-	-	-	-	-	-
Index Check							*0,00%*	*0,00%*	*1,04%*	*3,23%*	*5,73%*	*8,23%*	*10,73%*	*13,23%*	*15,73%*	*18,23%*
Revenues																
ERV (including solar)	1.532.658	01/09/2025	94	30/06/2033	*11.878.100*		-	-	1.149.494	1.532.658	1.532.658	1.532.658	1.532.658	1.532.658	1.532.658	1.532.658
Rental Growth	2,50%				*1.163.064*		-	-	11.974	49.492	87.809	126.125	164.441	202.758	241.074	279.391
Structural Vacancy	0,00%				-		-	-	-	-	-	-	-	-	-	-
ERV Solar					-		-	-	-	-	-	-	-	-	-	-
Rental Growth					-		-	-	-	-	-	-	-	-	-	-
Structural Vacancy	0,00%				-		-	-	-	-	-	-	-	-	-	-
Total ERV					***13.041.164***		-	-	**1.161.467**	**1.582.150**	**1.620.467**	**1.658.783**	**1.697.100**	**1.735.416**	**1.773.732**	**1.812.049**
Opex	10,00%				*-1.304.116*	-	-	-	-116.147	-158.215	-162.047	-165.878	-169.710	-173.542	-177.373	-181.205
Land Lease	€ 170.610,99				*-1.706.110*	-	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611
Land Lease Indexation	2,50%				*-129.469*	-	-	-	-1.333	-5.509	-9.775	-14.040	-18.305	-22.570	-26.836	-31.101
Non-Residential Opex	10,00%				-	-	-	-	-	-	-	-	-	-	-	-
Non-Residential Land Lease	€ -				-	-	-	-	-	-	-	-	-	-	-	-
Non-Residential Land Lease Indexation	2,50%				-	-	-	-	-	-	-	-	-	-	-	-
Total Opex & Leasehold					*-3.139.695*	-	-170.611	-170.611	-288.091	-334.335	-342.432	-350.529	-358.626	-366.723	-374.820	-382.917
NOI					***9.901.469***	**-**	**-170.611**	**-170.611**	**873.377**	**1.247.815**	**1.278.034**	**1.308.254**	**1.338.473**	**1.368.693**	**1.398.913**	**1.429.132**
Capex																
Asset Management Fee	0,75%					-	-	-	-	-	-	-	-	-	-	-
Annual Capex 1	5,00%	31/05/2027	73	30/06/2033	*-406.075*	-	-	-	-	-	-63.902	-65.413	-66.924	-68.435	-69.946	-71.457
Annual Capex 2	0,00%	31/05/2028	61	30/06/2033	-	-	-	-	-	-	-	-	-	-	-	-
Total hard cost	17.894.213	01/03/2024	18	31/08/2025	*-16.900.090*	-	-2.982.369	-11.929.475	-1.988.246	-	-	-	-	-	-	-
Soft Costs	1.210.156	01/03/2024	18	31/08/2025	*-1.142.925*	-	-201.693	-806.771	-134.462	-	-	-	-	-	-	-
Land + SC + HC Contingency	2,00%				*-365.860*	-5.000	-63.681	-254.725	-42.454	-	-	-	-	-	-	-
DMF (incl contingency, incl LH)	4,00%				*-814.599*	-10.200	-136.734	-526.463	-93.431	-6.824	-6.824	-6.824	-6.824	-6.824	-6.824	-6.824
Leasing Costs	217.474	01/09/2025	1	31/10/2025		-	-	-	-217.474	-	-	-	-	-	-	-
Total Capex					***-19.847.024***	**-15.200**	**-3.384.477**	**-13.517.434**	**-2.476.067**	**-6.824**	**-70.726**	**-72.237**	**-73.748**	**-75.259**	**-76.770**	**-78.281**
Total Dev Costs + Land	21.309.930				***-19.473.475***											
Exit																
Gross Exit Yield	5,00%				*32.206.739*		-3.412.220	-3.412.220	19.790.471	28.120.597	28.801.621	29.482.644	30.163.668	30.844.691	31.525.715	32.206.739
Gross Exit Yield	5,00%				-		-	-	-	-	-	-	-	-	-	-
Exit Costs	0,92%				*-295.573*		31.315	31.315	-181.624	-258.073	-264.323	-270.573	-276.823	-283.073	-289.323	-295.573
Total Exit Value					***31.911.166***		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**31.911.166**
VAT Deduction	0,00%				-		-	-	-	-	-	-	-	-	-	-
Total Exit Value after VAT Deduction	**31.911.166**				***31.911.166***		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**31.911.166**
Unleveraged, Pre-Tax, Pre-Fees					***21.715.611***	**-265.200**	**-3.555.088**	**-13.688.045**	**-1.602.690**	**1.240.990**	**1.207.308**	**1.236.017**	**1.264.725**	**1.293.434**	**1.322.142**	**33.262.017**
Equity Invested					***-19.111.023***	**-265.200**	**-3.555.088**	**-13.688.045**	**-1.602.690**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cum. Equity Invested					***-19.111.023***	**-265.200**	**-3.820.288**	**-17.508.333**	**-19.111.023**	**-19.111.023**	**-19.111.023**	**-19.111.023**	**-19.111.023**	**-19.111.023**	**-19.111.023**	**-19.111.023**
IRR	10,84%															
EM	2,14															
CoC	4,82%						*-4,47%*	*-0,97%*	*4,57%*	*6,53%*	*6,69%*	*6,85%*	*7,00%*	*7,16%*	*7,32%*	*7,48%*
CoC (post-completion)	6,70%								*4,57%*	*6,53%*	*6,69%*	*6,85%*	*7,00%*	*7,16%*	*7,32%*	*7,48%*
Leverage																
Facility I - Acquisition																
Beginning Balance	50,00%						125.000	124.479	123.958	-	-	-	-	-	-	-
Draw Down	01/05/2023	3,00 years			***125.000***	125.000	-	-	-	-	-	-	-	-	-	-
Amortization - amounts	5,00%				*-1.563*	-	-521	-521	-521	-	-	-	-	-	-	-
Bullet Repayment	31/05/2026				***-123.438***	-	-	-	-123.438	-	-	-	-	-	-	-
Ending Balance						125.000	124.479	123.958	-	-	-	-	-	-	-	-
Arrangement Fee	1,00%				*-1.250*	-1.250	-	-	-	-	-	-	-	-	-	-
Other Running Costs	0,00%				-	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee (on remaining balance)	0,50%				-	-	-	-	-	-	-	-	-	-	-	-
Undrawn Debt						-	-	-	-	-	-	-	-	-	-	-
Interest - amount	6,50%				*-24.273*	-	-8.125	-8.091	-8.057	-	-	-	-	-	-	-
Debt Cash Flow - Facility I					***-132.016***	**123.750**	**-8.646**	**-8.612**	**-132.016**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Facility II - Capex																
Beginning Balance	50,00%						7.600	1.685.673	8.373.902	-	-	-	-	-	-	-
Draw Down	01/05/2023	3,00 years			***8.458.555***	7.600	1.692.238	6.758.717	-	-	-	-	-	-	-	-
Amortization - amounts	10,00%				*-155.141*	-	-14.165	-70.488	-70.488	-	-	-	-	-	-	-
Bullet Repayment	31/05/2026				***-8.303.414***	-	-	-	-8.303.414	-	-	-	-	-	-	-
Ending Balance						7.600	1.685.673	8.373.902	-	-	-	-	-	-	-	-
Arrangement Fee	1,00%				*-84.586*	-84.586	-	-	-	-	-	-	-	-	-	-
Other Running Costs	0,00%				-	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee (on remaining balance)	0,50%				*-33.794*	-	-33.794	-	-	-	-	-	-	-	-	-
Undrawn Debt						-	6.758.717	-	-	-	-	-	-	-	-	-
Interest - amount	6,50%				*-654.366*	-	-494	-109.569	-544.304	-	-	-	-	-	-	-
Debt Cash Flow - Facility II					***-8.918.206***	**-76.986**	**1.643.786**	**6.578.660**	**-8.918.206**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Facility III - Refinance																
Beginning Balance	8.426.852						-	-	-	8.426.852	8.426.852	8.426.852	8.426.852	8.426.852	8.426.852	8.426.852
Draw Down	31/05/2026	7,00 years			***8.426.852***	-	-	-	8.426.852	-	-	-	-	-	-	-
Amortization - amounts	0,00%				-	-	-	-	-	-	-	-	-	-	-	-
Bullet Repayment	31/05/2033					-	-	-	-	-	-	-	-	-	-	-8.426.852
Ending Balance						-	-	-	8.426.852	8.426.852	8.426.852	8.426.852	8.426.852	8.426.852	8.426.852	-
Arrangement Fee	1,00%				-	-	-	-	-	-	-	-	-	-	-	-
Other Running Costs	0,00%				-	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee (on remaining balance)	0,50%				-	-	-	-	-	-	-	-	-	-	-	-
Undrawn Debt						-	-	-	-	-	-	-	-	-	-	-
Interest - amount	5,50%				*-3.244.338*	-	-	-	-	-463.477	-463.477	-463.477	-463.477	-463.477	-463.477	-463.477
Debt Cash Flow - Facility III						**-**	**-**	**-**	**8.426.852**	**-463.477**	**-463.477**	**-463.477**	**-463.477**	**-463.477**	**-463.477**	**-8.890.328**
Leveraged Cash Flow Pre-Tax, Pre-Fees					***17.673.004***	**-218.436**	**-1.919.948**	**-7.117.997**	**-2.226.060**	**777.514**	**743.831**	**772.540**	**801.248**	**829.957**	**858.666**	**24.371.688**
Equity Invested					***-11.482.440***	**-218.436**	**-1.919.948**	**-7.117.997**	**-2.226.060**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cum. Equity Invested					***-11.482.440***	**-218.436**	**-2.138.384**	**-9.256.380**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**
IRR	13,61%															
EM	2,54															
CoC	4,31%						*-9,96%*	*-3,11%*	*2,80%*	*6,83%*	*7,09%*	*7,36%*	*7,62%*	*7,88%*	*8,15%*	*8,41%*
CoC (post-completion)	7,02%								*2,80%*	*6,83%*	*7,09%*	*7,36%*	*7,62%*	*7,88%*	*8,15%*	*8,41%*
Corporate Income Tax	25,80%	€ 200.000						-	-	-	-	-	-	-	-	-3.273.424
	19,00%	>0,<200,000														
Net Cash Flow Post-Tax					***14.399.580***	**-218.436**	**-1.919.948**	**-7.117.997**	**-2.226.060**	**777.514**	**743.831**	**772.540**	**801.248**	**829.957**	**858.666**	**21.098.264**
Equity Invested					***-11.482.440***	**-218.436**	**-1.919.948**	**-7.117.997**	**-2.226.060**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cum. Equity Invested					***-11.482.440***	**-218.436**	**-2.138.384**	**-9.256.380**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**	**-11.482.440**
After Tax Levered IRR	11,88%															
After Tax Levered EM	2,25															
After Tax Levered CoC	4,31%						*-9,96%*	*-3,11%*	*2,80%*	*6,83%*	*7,09%*	*7,36%*	*7,62%*	*7,88%*	*8,15%*	*8,41%*
CoC (post-completion)	7,02%								*2,80%*	*6,83%*	*7,09%*	*7,36%*	*7,62%*	*7,88%*	*8,15%*	*8,41%*

B

Focus group preparation – Circular strategies.

After reviewing the literature and consulting with professors, I have categorized circular strategies into four divisions. It's also possible to employ a combination of these strategies. The building doesn't have to be entirely circular; for instance, exploring the impact of substituting a steel structure with a wooden one could be interesting.

Refuse

The primary goal of the "Refuse" strategy is to prevent waste and reduce the environmental footprint. This is achieved by refusing to use or produce materials, construction, or processes that are known to be environmentally harmful or inefficient. Possible actions are checking whether structures, certain functions thereof, building components and products are needed, and eliminating unnecessary items, or designing more efficiently and optimally. In essence, it is:

- No (Re)construction.
- (Re)construction with less material use

Reuse

This strategy makes use of existing materials by reusing existing materials and recycled ones. Reuse preserves the inherent value of products and materials. Instead of discarding items after a single use, they are collected, refurbished if necessary, and reintroduced into the building. Examples from CB'23:

Figure 1 - Examples reuse strategy from Platfrom CB'23, (2021)

Renewable (biobased)

This strategy focuses on designing with as many building materials from renewable sources. A renewable resource is grown, naturally replenished, or naturally cleaned on a human time scale. Examples of renewable building products are shells, wood, and fibres. Example from CB'23:

Figure 2 - example renewable strategy from Platfrom CB'23, (2021)

Reusable (Adaptable and demountable)

In designing for reusable, it is assumed that a structure can cope with different future scenarios with different needs and requirements, which ultimately extends the life cycle. In this context, it is important that the design enables the harvest of the materials during and after the life cycle, without damage and reused at the highest possible quality. Examples from CB'23:

Margarethacomplex Kampen – adaptief vermogen

© LKSVDD Architecten

De structuur van het Margarethacomplex is op het stedelijk weefsel van de historische binnenstad van Kampen afgestemd. Het betoncasco is in een zo rank mogelijke kolomstructuur uitgevoerd. Per verdieping is meer hoogte dan noodzakelijk toegevoegd. De gevels zijn uitgevoerd in houtskeletbouw, waardoor de gevelindeling in de toekomst kan worden aangepast. Bij verandering van functie is het casco vrij in te delen en wordt de levensduur van het bouwwerk verlengd. Daarnaast is het casco met een betonkernactivering uitgevoerd. Deze is aan een bodembron gekoppeld. De installaties zijn deels per stramien verticaal te koppelen en ook deels in de gangzone onder de vloer in een plafondzone aangebracht. Vanuit hier kunnen de woningen worden 'gevoed'.

Tijdelijke rechtbank

Tijdelijke Rechtbank Amsterdam © Leon van Woerkom

De rechtbank in Amsterdam moest een periode van vijf jaar overbruggen tot een permanent gebouw. Dit resulteerde in het ontwerp van een tijdelijke rechtbank van 5400 m², waarbij rekening is gehouden met het demonteren van de constructieonderdelen door boutverbindingen te gebruiken. Zelfs de koppelingen tussen de vloerschijven en de hoofddraagconstructie zijn demontabel gemaakt. Ook de fundering is opgebouwd uit prefabonderdelen, zodat deze gedemonteerd en opnieuw kunnen worden gebruikt. De posities van de kolommen en de hoogte van de verdiepingen zijn zo gekozen dat ze ook in een kantoorgebouw passen. De tijdelijke rechtbank is in 2015 gebouwd in Amsterdam en in 2021 gedemonteerd. Met de bestaande elementen wordt het gebouw 'Techbank Enschede' gerealiseerd.

Figure 3 - Examples for reusable strategy from Platfrom CB'23, (2021)

C

Transcript single focus group discussion (Dutch)

Transcript

Speaker 3

Om een stukje mee te nemen? De hal bestaat uit twee of 3 bouwdelen, dus Het is een ander bouwjaar waarbij je de linkerkant bijvoorbeeld een andere grit maat hebt dan aan de rechterkant.

Speaker 1

Ah oke ja. Dus ja, nu is het een beetje. Ik heb jullie wat dingen opgestuurd en wat voorbeelden? Dus wat zou volgens jullie bijvoorbeeld aan de hand van die strategieën die ik als eerste heb opgestuurd, zouden jullie zeggen van nou, Dat is wel echt die heel toepasbaar voor deze situatie. Of Ik heb hier ook wat extra voorbeelden neergezet. Dus ja.

Speaker 4

Kan jij? Nog een keer door al die hoofdlijnen lopen, zodat we. Weer gerefreshed zijn dan wat ze precies zijn en dat ons hersenen gaan werken.

Speaker 1

Dus de refuse strategie is voornamelijk om ja waste prevention en reduce environment Footprint, dus Dit is best wel de hoogste circulaire strategie. Zeg maar dus echt het afwijzen van bepaalde materialen en een totaal ander materiaal toepassen, dus bijvoorbeeld het afwijzen van beton en cement loos beton toepassen bijvoorbeeld. Het is een strategie die niet ja, super veel wordt gebruikt, ook Omdat het best wel moeilijk toepasbare strategie is. De reuse strategie is dus echt letterlijk het gebruik maken van bestaande materialen, dus bijvoorbeeld kunnen we de fundering hergebruiken. Kunnen we recyclede materialen toepassen? Staal uit een andere hal hal gebruiken bijvoorbeeld. De renewable dus biobased is echt het gebruik maken van bijvoorbeeld houtbouw of er een biofoam? Voor isolatie of van Er zijn ook producten van shells en van Van houten dus en van fibers, dus Dat is echt de biologische kringloop, zeg maar. En de strategie reusable is dus echt het gebruik maken van een gebouw dat te veranderen is, dus adaptable en maar ook een gebouw wat totaal demontabel is, zodat het later ergens anders bijvoorbeeld neer kan gezet worden. Of dat de materialen ergens anders gebruikt kunnen worden. Dus dat zijn een beetje de de 4 strategieën die zoals ik ze nu had bepaald.

Speaker 5

Wacht er waren toch 6 R'en

Speaker 1

Klopt, Maar ik heb uiteindelijk gekozen om een een vierdelig te maken om dat best wel veel van die R overeenkomen zoals ze Er zijn, zelfs waar ze 12 r gebruiken dus. In principe is

Speaker 5

Het was meer mijn hoofd, dacht ik ja, ik dacht dat de 6 waren.

Speaker 1

Het is toepasbaar tot in ieder geval zoals ik het zie. En Dat is ook meisje. Mijn conclusie Waarom ik deze 4 heb gekozen is dat deze 4 zijn het meest toepasbaar In de gebouwde omgeving.

Speaker 4

Oké, zou je het kunnen? Ja. Oké, dus de vraag is, Als we heel vrij gaan denken.

Speaker 1

Heel vrij dank inderdaad.

Speaker 4

Zouden we doen in deze specifieke locatie?

Speaker 1

Anders is het handig om eerst. We hebben nu het bestaande gebouw. Zijn er bijvoorbeeld dingen die we uit het bestaande gebouw kunnen hergebruiken?

Speaker 3

Ja, je zou je zou dan bijna alle R'en kunnen gebruiken, want heel abstract denkend zou je bijvoorbeeld. De kantoordeel los kunnen trekken van Van de hal en Dat is gewoon als separator business case zien, waarbij de huidige kantoor. Heel anders gaat inrichten en op de markt gaat zetten. Door het volledig multi tenant te maken bij wijze van dat hebben we. Mijn inziens nog niet goed getest op de markt en dat zien we aan de overkant bij brightlands bijvoorbeeld. Alleen dat dat wijkt dan wel af hoe? Of het park inzetten. Ja en kijken naar de andere, r denk ik dat je van In de hal. Qua staalconstructie in ieder geval heel veel kan hergebruiken, afhankelijk hoe je dat kan herin zetten. Ik weet niet hoe dat technisch precies gaat. De fundering is daar vrij goed. En de grondlagen zijn, daar is daar vrij goed in venlo. Vandaar dus dat dat scheelt enorm. En dan heb je de vloer, die is echt in slechte staat het dak, daar heb je asbest panelen. Dus de vloer en dak zijn wel echt? Hoge prioriteit in deze, die je niet her kan gebruiken Niet aan de gevel tot loading docks, dan kan je allemaal wat van vinden.

Speaker 1

Oké, dus het hergebruik van de fundering is bijvoorbeeld een mogelijkheid en dan een staalconstructie, maar een staalconstructie zou bijvoorbeeld niet hergebruikt kunnen worden In het nieuwe gebouw.

Speaker 3

Ja afhankelijk hoe je dat inzet. Volgens mij hebben we wel eens gekeken naar het eventueel verhogen van het dak, dus dan krijgt zo'n hulp staalconstructie je wilt begrijpen. Waar je dan wel blijft meezitten? Is je inefficiente grid. Dus hoe, ja, hoe je daar dan je staat als structie kan hergebruiken. Zou je fundering poeren ook moeten meenemen?

Speaker 5

Volgens mij is dit nu de situatie. Dit is de hal: Fundering, draagstructuur. isolatie eromheen. Fundering heeft te maken met kilogrammen. Zolang dat hetzelfde blijft, kan je. Gewoon mee houden en anders. Kan je er eventueel een paar palen bij zetten, maar dan kan je hem gewoon volledig bij houden, maar dan. Voeg je een of twee dingen toe? De draagstructuur die bepalend Omdat hier zon soort vak. Dat ding zit dan wel wat van sheddak, dus daardoor heb je relatief beperkte vrije hoogte. Dat is tegenwoordig gewoon niet meer In de mode om dat soort spullen. Te hebben, want je wil? Het liefst wil je hem?Wil je hem weer?

Bruikbaar deur maken wil je hem maken naar de standaard van. De techniek die we nu.

Dat eigenlijk gaan verhogen? Als je het zou willen, dan kan je er dus segmenten tussen gaan zetten. Alleen dan ben je de hele. Hal ontmantelen en opnieuw opbouwen. Met de zelfde materiaal. Niet helemaal waar? Want er worden kosten baten verhaal zeg je heel veel arbeid. Aan het doen.

Terwijl Bijna iedere aannemende partij zal zeggen, gooi het blad bouwen, nieuwe sneller verkopen in mijn hoofd is de logica ver te zoeken dan het staal ligt er al, dan ga je staal kopen.

Dat is een beetje gek. Op papier komt het dan vaak wel. Financieel zo uit. Oké en Als je dit maar je zou in theorie dan delen ertussen kunnen gaan zetten, en dan krijg je het feit dat we hier constructief. Komt er een moment probleem, want je hebt letterlijk twee stukken stalen elkaar. Die gaan dan. Weer met elkaar in verbinding staan, dus die moet je dan moment. Vast verbinden en. Dan wordt het vaak heel snel, heel duur. Dit is eigenlijk. Wat je ziet en wat tegenwoordig ook zo is, is die jas rondomheen. Die heeft Natuurlijk jarenlang de zon erop gehad, dus die afwerkingen van die gevel is vaak verweerd verteerd en gewoon slecht. Bijna altijd zie je wel dat? In ieder geval de jas er rond omheen vernieuwd wordt. En dan. Het is gewoon simpelweg Omdat. Meerjaren onderhoud kan je maar beter gaan denken. Helemaal vernieuwen, Dat is dan wel op gegeven. Moment niet meer logisch om de hergebruiken

Speaker 1

Dus, zoals ik het nu begrijp, is het zeer lastig om zeg Maar dat bestaande de fundering zou bijvoorbeeld dus heel goed hergebruikt kunnen worden.

Speaker 7

Ja, Omdat je Maar dat is Natuurlijk een geloof, wat je daar allemaal ook. Kijk, alles is,.. perspectief is waarheidt en In de uitvoerings markt zeker is het zeg maar husselen met een bestaand pand dat dat dat dat willen. Ze gewoon liever niet. Omdat, zeg maar productie matig, seriematig of gewoon gewoon nieuwbouw gewoon snel bouwen. Dat is uiteindelijk gewoon makkelijker. Werken is gewoon eigenlijk gemakkelijk, want dan heb je iets waar je rekening mee moet houden. Er is namelijk nog niks. Van, dan kan je gewoon lekker lekker door. En dan kan je ook helemaal doen. Zoals jezelf? Ook is, net zoals de Mini hoe jij je huiswerk doet of hoe een aannemer bouwt. Dat doet hij al jarenlang zo. Dat vindt hij ook fijn om zo te blijven doen. Vaak zie je dat de uitvoerende kant zegt, nee, nee, nee, ik hoef het liever niet, maar mijn overtuiging is Als je op palen hebt, je hebt al een balk. Je hebt wel een fundering, je hebt heel veel. Dingen al herbruikt. Die gewoon Als de belasting van het pand er bovenop. En simpelr iets meer wordt Omdat je gebouwen hoger wordt, dus je hebt meer kuubs en uiteindelijk dus meer gewicht. Voeg dan wat palen. Toe en. Wat hier soms punt is? Door het heen en weer rijden van die vrachtwagentjes. Jarenlang is die vloer inderdaad wat gekraakt of verweerd. Nou. Dan is het letterlijk dus. Gewoon simpelweg deze heel laag. Ik bedoel, laagste uithalen? Ik heb ook nieuwe.

Speaker 5

Houdt van de vloer af, want Ik denk dat jij bedoelt. in Venlo hebben bijvoorbeeld heel veel asfalt vloeren.

Speaker 7

Asfalt moet er sowiezo uit

Speaker 2

Bijvoorbeeld wordt al niet niet snel scheuren door. Nou, maar dan is ie. Dan is er wat anders aan de hand.

Speaker 7

Dan hebben ze hem te zwaar? Belast ja Dat is ook typisch Omdat. Het wordt geëngineerd op 2500 kg, maar dan soms dan zet zo een aannemer of zon uitvoer zon handelaar wel eens 5000 kg neer moeten kunnen. Want ja, hé, Het is een betonnen. Vloer en dat? Blijkt uiteindelijk toch niet aan te kunnen. Plus niets in Nederland is vlak niets. in Nederland blijft altijd blijft altijd vlak, dus dat werkt altijd een beetje.

Speaker 6

En wat ik Ook merk met logistiek, is dat ze tot de rand aan engineeren. Dus vloertjes maken van 15 18 zit een beetje.

Speaker 7

Toe is, Maar het is inderdaad een. Het is net als In de petrochemie, alle geld gaat naar de productielijn toe en Dat is in handel ook. Dit is uiteindelijk niks anders dan een dure overkapping en Omdat je droog staat en dat je waar netjes verzorgd blijft, maar verder. Verder hebben ze geen enkel belang om het net even dat streepje extra te doen. Het is inderdaad een zeker hardeman hallen, Dat is de ultieme voorbeeld daarvan. Hardeman hallen en echt top tot op de millimeter. Ja, uitgenast, daar zijn ook heel goed in, want dat vinden ze ook het stoerste wat Er is, want dan zijn ze. Heel goed. In de top op de laatste euro zijn het uitknijpen van Van van wat er kan. Bijvoorbeeld ja waar bijvoorbeeld Als je dan een nieuwe percelen op het dak neerzet, dan krijg je meer kilos Alleen al een paar panelen op het dak. Dan kan het dak kan gewoon niet meer hebben. Zo krap is het geengineerd

Speaker 7

Daarom zie je wel eens In de krant Als het dan een keertje hevig geregend heeft dan donderd al die hallen inelkaar Omdat het het water niet aankan. Dat zijn allemaal hardemanhallen en die zijn allemaal echt tot op het randje geëngineerd.

Speaker 1

Dus zeg maar. Een strategie reuse zou dan bijvoorbeeld grootste gedeelte van het gebouw hergebruiken, dus ook de staalconstructie, de fundering en de vloer zouden dan sowieso uit moeten. En wat nou zeg maar In het achterhoofd houden dat we uiteindelijk en dat het een positieve investeringsbeslissing moet worden, zou het dan bijvoorbeeld meer opleveren als er een nieuw circulair gebouw komt? Dus in plaats van de staalconstructie maken we een houten constructie, of dan maken we. Gebruik van andere isolatiemateriaal.

Speaker 7

Die persoon, is koning hout.

Speaker 5

Ja, Maar het probleem is, Het is. Toevallig net die heb je? De getallen ook gezien Natuurlijk een onderzoekje. Gedaan van wat? Kosten die verschillende. Opties Als je meer naar hout gaat? Je ziet gewoon dat er een hele grote investering. Tegenoverstaat. Die ik nergens terug verdienen, want Er is nog geen geen huurder die zegt Van Ik wil een CO2 positief gebouw hebben van jou als verhuurder jammer genoeg.

Speaker 7

De vraag is eigenlijk, is men bereid om een premium te betalen en eigenlijk? Zeg je dat antwoord is nee. Nee als als zo'n komkommer boer?

Speaker 5

Wat Ik denk, Maar dat is gewoon een gut feeling bij mij. Ik denk dat ze. Of dit gesprek over 10 jaar terugkijken en zeggen van Jezus, Wat zijn we dom geweest? Want toen. Niet gewoon door te douwen?

Speaker 7

Denk het ook.

Speaker 5

Inhoud, Omdat gaan alle CO twee wat erin zit, gaat wordt belast. Je gaat gewoon kijken van hoeveel Energy verbruikt het gebouw. Zit je boven een bepaalde bepaalde waarde moet je betalen. Het gebouw, zeg maar. Als casco moeten we bepaalde CO twee? Waarde hebben in design. Zit dat er niet in? Krijg je gewoon een boete? Wat Frankrijk doen ze dat al? Daar hebben ze nu gewoon Als je nu moet het ontwerp helemaal uitrekenen op een co twee equivalent. Tijdens die nieuwbouw? en die wordt die dat getal is, maar bij wijze van spreken je mag 500 kg co2 equivalent per vierkante meter in nieuwjaren. Op dit moment volgend jaar is het gewoon 450, dit jaar daarop 400, daarop 300. Dus van de enige manier van overheid van het sturen om net zero carbon te halen in. In 2050.

Speaker 3

En, Dat is het moment dat je het ook meteen kosten matig in je business. Case voelt. Maar dan. Volgens mij, volgens mij is het er al, maar hoeft niet voor iedere sector de gebouwde omgeving die ontloopt het nog. Volgens mij betalen voor sommige sectoren € 80 per megaton of. Zo Er is, Er is in ieder geval een.

Speaker 5

En, dat weet ik nog niet. Maar dat is dat Ik ben.

Speaker 3

Prijs voor voor de CO twee uitstoot

Speaker

Ja, Maar dat ja maar.

Speaker 5

Dat ja, maar is dat nou een bepaalde? CO twee handel Maar dat is een bepaald CO 2 ofsetting Wat ze aan? Het doen zijn volgens mij is. Dat niet is? Dat is niet een. Formeel iets, want bij de een kost die. CO twee. Ton kost € 25 en bijna andere kost het € 200.

Speaker 3

Duidelijk in gehandeld.

Speaker 1

Dus momenteel is gewoon waar je obase bouwen en dat voor nou nou in ieder geval hout is dan gewoon op dit moment te duur.

Speaker 4

Ja, Maar ik denk. Bij elk van deze berekeningen? Het is heel simpel, Het is gewoon Kosten revenues profit zeg maar. Elk van die aspecten heeft heel veel ingrediënten. Ja en voor. Voor kosten is dat heel makkelijk. Dat is gewoon oké Als je het korter. In een kortere bouwtijd. Doet of Als je mass production doet. Dus je zegt? Ik ga een. Er is een woningbouw bedrijf die volgens mij voor faillit gaat in een paar jaar of volgend jaar. Maar goed. Hoe is die? Mensen en houtbouwbedrijf die een hele assebly line hebben gemaakt, een Factory alles. En, die hebben gewoon een standaard woningtype. Van houtbouw gemaakt, die maakt, die maakt gewoon altijd dezelfde soort types en die willen die. Ja, die moet er volgens mij 2500 woningen per jaar produceren om profit te maken. Dat is gewoon een mass production methode om geld te verdienen terwijl hout nog steeds duurder is, maar Omdat je het zoveel Als je zoveel maakt en als die assembly line kan doordraaien dan uiteindelijk draai je wel een Profit in hun business case.

Kijk, Dat is wel zonder land kosten. Weet je, Ik ben niet hoe dat allemaal werkt in hunb business plan, Maar dat is wel het overzicht. En voor revenuws voor sommige huurders Ik denk, nu is dat. Niet het geval, maar. Het uiteindelijk gaan huurders meer betalen voor een meer eco gebouw. Dat gebeurt al een. Beetje In de Markt maar Omdat het moet en die moeten dus dan ook terug rapporteren aan hun investeerders, dat zij in een gebouw zitten dat energielabel. A blablabla heeft. En dat ja is een beetje het geval, Maar ik denk nu met het wat we nu kijken naar nobo, dat we een energielabel van boven van boven c moeten hebben voor voor alle kantoren bij 2030. Uiteindelijk wordt dat niet Alleen een requirement vanuit. Nou, ja, in dit geval EU over maar. De gebruiker gaat dat ook meer eisen?

huurder wil dat ook zelf. Die willen een betere reputatie hebben. Ja, en daardoor ik zit. Ik denk dat we gewoon nu in een soort van transitie zitten waar de kosten hoger zitten, Omdat de revenues niet gecorrigeerd zijn. En investeerders kantelen, nu meer en meer en meer. Oké, bij dit gebouw maak ik minder geld. Mijn profit is lager, Maar dat corrigeer ik met een paar hele hele sterke Investeringen die gewoon heel veel geld verdienen, maar in mijn portfolio gemiddeld kan ik dit zelf teruggeven, dus die investeerders dus op hun marketing zeggen ze, ja, We zijn super ecofriendly blablabla en dat zijn op dit moment de gebouwen die lager draaien voor hun. Maar in hun portfolio hebben ze ook gewoon een paar assets die nou. Misschien hebben ze al jaren en die gaan gewoon heel goed en dat vinden heel veel geld.

En dan uiteindelijk in die marketing ding kan je gewoon zien. Kijk we hebben dit hout building en het gaat allemaal goed. Reporting dus om het zo wat Speaker 5zegt. Het telt nu op dit moment niet op, Maar dat is. Als je het heel. Basic kijkt van. Aan het einde van de dag Als we kijken voor, in dit geval INVESTMENT FUND. Telt het niet op, Maar ik denk over twee jaar, zegt INVESTMENT FUND. Van ja was wel jammer dat we toch niet in hout hebben gedaan. En toen wij plot m maakte uiteindelijk, toen hadden we een heel gesprek. Toen moesten we terug naar de IC, Omdat de kosten helemaal omhoog gingen en midden In het moment dat we waren aan het onderhandelen met de aannemer.

En, nadat We hadden dat getekend, dit was volgens mij. Toen wij in Houston waren in 2020. dus Dat was echt het moment wanneer alles mega omhoog ging en wij moesten hele tijd terug zeggen van oh, Het is weer hoger. Het weer hoger, heel shit lala. En toen hebben we uiteindelijk kosten gespaard In het brEEAM verhaal. Ja en nu, zegt INVESTMENT FUND. Nou, Het is heel jammer dat we niet excellent hebben en waarom hebben we niet gekeken om die kantoren en het in hout te bouwen? En dan denk ik. Nou ja, Omdat wij die. Returns willen halen dus. Het is Er zijn zoveel aspecten en Ik denk eigenlijk dat dat dat in jouw rapport eruit moet komen, want Het gaat nooit zijn dat je ziet. In een typische business case dat dit beter gaat draaien. Dat is denk ik. Anders zou ik, net zoals Ikea, IKEA gaat nooit in een houte gebouw zitten

Jammer, want het telt gewoon niet op en maar Als je het in een meer complex verhaal maakt of een meer creatieve, dan is het van. Ja dan denk ik dat ten eerste investor appetite een van jouw condities

moet zijn, want Ik denk dat dat eigenlijk de meest bepaalde factor is, want Als je zegt je telt niet op financieel, dan is dat in en In een bepaalde waarde van het investeerder en per investeerder is dat net wat anders, want die hebben net een ander verhaal

Speaker 1

En dan bedoel je zeg Maar dat een investeerder meer waarde hecht aan een heel duurzaam gebouw of een heel eco friendly friendly gebouw, ja.

Speaker 4

Dus Bouwendinvest heeft nu een impact fund. Dat gaat helemaal over sociale impact en die hebben letterlijk gezegd van ja, maar dit kunnen we. Omdat we een paar? We gaan gewoon een paar gebouwen kopen die een yield hebben van 2% en dan hebben we een paar van 6%. En dan gemiddeld kan ik terug zeggen naar de investeerder zitten we op 6%, dus het komt helemaal goed uit.

En, Ik denk dat dat? Een super belangrijk aspect wordt voor jouw voor het uiteinde dat je creatief moet Opbouwen hier businessplan moet creatief opgebouwd worden om een argument te kunnen hebben van ja, We gaan dit hele ding met fungy bouwen en en Dat is goed voor de environment. En Dat is ook zo, maar financieel is dat een hele. Creatieve soep.

Speaker 3

Is Misschien ook niet de reden. Dat het. Wat duurder is of of? Ja meer kosten met zich meebrengt, dat ook gewoon een beetje het onbekende is het onbekende van het volledig bouw inhoud, het hele leveranciers lijn of proces van. Het omkappen van bouwen naar de bouwplaats brengen, moet dat ook gewoon nog een beetje in transitie is vanuit aannemers en fabrikanten.

Speaker 5

Wat je ziet is dat zowel bij bij wijze van spreken, het kantoorgebouw woongebouw hout bouwen. Dat is minder Grote Prijs bol dan logistiek, want logistiek is gewoon zo uitgedasd

Je zet letterlijk Dat hij de prijs binnen gekregen voor gevel. Via Remmers, Het is gewoon 67,5 euro. Heb je geïsoleerde gevel Dat is echt 3 keer niks. Dan heb je een heel klein paneeltje

Speaker 1

Ze zitten gewoon helemaal op het onderste van wat onderste, zeg maar ja.

Speaker 5

Zit al van het onderste? Dus wel je een houte paneel toepassen dat kost gewoon 175 euro per vierkante meter. Dus dat ga je never nooit? Toepassen op een logistieke hal en. Dat is helemaal super het is ook biobased reusable.

Speaker 7

Maar hout versus een aluminium gevel of een stalen gevel. Dan kiezen ze meteen voor aluminium en staal in plaats van hout

Speaker 5

Dat heeft ook te maken met wat je wat je opslaat in je hal klopt. Dus dan zou je eigenlijk eerst nog een ander paneel moeten aanbrengen. Voordat je dit, ja?

Speaker 7

Tot tot 2 m 3 m en daarboven. Want anders gaan die mensem met fork heftrukjes ertegen aan die.

Speaker 1

En wat ik nog niet echt gehoord heb, is zeg maar reusable, dus. Een logistieke hal is Natuurlijk al best wel adaptable, zou ik zeggen. Het is best wel gewoon een gewoon 1 grote hal en daar is veel mogelijk, maar. Merken jullie dan ook bij dat huurders echt een van de binnenkant van zon hal heel anders willen en dat het dan bijvoorbeeld heel strategisch is om te zeggen, oké, we maken de hal ontwerp hem helemaal adaptable, zodat die. In andere vormen toepasbaar is

Speaker 5

Is na de Dat is. Dat is eigenlijk ook al uitgedast en wat je ziet, is dat er nu zegmaar al een grid is. Zeg maar een grid formaat van altijd, een tussenmaat van 21 1/2 M en ook daar komt In het pallet systeem wat we gebruiken in Nederland of Europa dan heb je de goede verdeling? Dus hoever moet het adaptable zijn Als je een gripmaat hebt van 21 meter?

Speaker 1

Het zijn gewoon logistiek is best wel gewoon standaard maten en Dat is dan eigenlijk al heel erg adaptable, zeg maar.

Speaker 4

Ja maar. Ik zit wel te denken van hoe gaat logistiek veranderen over de komende 20, 30 jaar voor lifespan van een gebouw, laat maar zeggen, 50 jaar. Nou ja we. Kunnen niet per se visualiseren hoe dat allemaal eruit gaat zien, Maar ik denk wel dat logistiek een hele grote. Verandering gaat maken in hoe dingen gemaakt worden en geprocesd worden, en het hele distributienetwerk. Van de wereld, Ik denk dat dat echt wel een interessante verandering gaat maken ten opzichte van het verschil van hoe Mensen gaan wonen.

Speaker 5

Denk je dat het meer gedecentraliseerd? Wordt dus dat er meer lokaal transport geproduceerd.

Speaker 4

Nou, ja, ik zit gewoon te denken van oké, Population Increases. Schaars land. Logistiek distributiecentra zijn megagroot. Ik heb geen idee. Maar ik denk dat logistiek van Van de logistiek en kantoor Misschien retail.De de grootste verandering gaan maken Als je dat. Naast woning trouwens zet.

Speaker 5

Ik weet niet in hoeverre dat doorzet, want jij bedoelt Misschien ook zon Adidas fabriek die vroeger kreeg ze allerlei materialen. Allemaal apart toegeleverd 4000 witte bij wijze van spreken om dat bij elkaar te brengen. Nu brengen ze alleen de grondstoffen erheen. De bepaalde korrel voor de de schoenzool, een bepaalde stof voor de bovenbouw en dat wordt in die fabriek wordt het allemaal samengesteld. bedoel je dat dat soort ontwikkelingen?

Speaker 4

Ja bijvoorbeeld, maar ook. Ik denk dat AI en Technology echt echt heel snel gaat en dat wij niet realiseren hoe snel dat gaat. Vooral Als je niet In de Computer Science wilt helemaal zit. En ik.

Speaker 3

Bijvoorbeeld picknick, picknick, picknick.

Speaker 4

Oh ja, zeg ja maar. Ik denk dat Iedereen onderschat. Hoe? Hoe Technology en invloed gaat maken over General distribution de wereld en Ik heb geen idee nog hoe dat eruit gaat zien, maar denk ik dat logistieke gebouwen adaptable zijn aan de ene kant wel.

Speaker 1

Maar het zou niet zeg maar een strategie zijn waar je heel erg op zou ontwerpen. Zeg maar om het gebouw een adaptable te maken,

Speaker 4

nee, Maar ik denk wel dat het over 20 jaar 25 jaar. Wel denken wel. Van oké, deze gebouwen zijn allemaal niet. Zo handig meer, want ze hebben niet genoeg stroom, of ze hebben niet ge.

Ze kunnen niet zoveel belasting aan, of.

Speaker 5

Weet je dat? Misschien wel 80% van de logistieke hal is reusable dat al het staal is herbruikbaar je beton ook Als je die er helemaal. Uit vreest is ook weer. Herbruikbaar de enigste wat moeilijk is, denk ik, is de paneel te gevel paneel en Er zijn ook partijen die daar een. Zeggen ze cradle to cradle payleven zoals falk

Speaker 1

Ja, Dat is nu heel erg wat je ook zeg, maar ziet dat je de façade zegmaar leased

Speaker 7

Dat gaan we nooit doen. Nee, nee, en Het is eigendom van een ander in jouw eigendom. Never.

Speaker 5

verschuiven van kosten, hè?

Speaker 1

Ja, Dat is zeg maar, valt ook onder reusable. En dat past Natuurlijk wel heel goed, aangezien een logistieke hal dus best wel standaard maten heeft. Dan zou bijvoorbeeld Als je die demountable maakt, is echt allemaal losse verbindingen. Dat je gewoon echt heel veel daarvan kan hergebruiken in een latere gedeelte.

Speaker 3

Dat zou ik ook geen gek idee vinden. In de zin van stedelijke ontwikkeling. We hebben 50 jaar geleden behouden we fabrieken die nu midden In het centrum staan. Of tenminste aan de rand van het centrum als we die vroeger demontabel hadden gebouwd, dat we van de ene plek naar de andere plek wellicht kunnen meenemen, mogelijk van de andere kwaliteitsaspecten toendertijd. Maar heb je idee aanzich is goed.

Speaker 5

Wat killing is tegenwoordig is wat eigenlijk eigenlijk net al zei. De je arbeidsloon is zo hoog per uur dat het moment dat ik iets ga slopen en weer ga opbouwen. Klopt het kostenplaatje maar niet.jammer genoeg?

Speaker 3

Tenzij het land goedkoper is

Speaker 1

Nou ja, bijvoorbeeld, wat jullie nu hadden voorgesteld voor deze is om zeg Maar het bestemmingsplan te wijzigen en de wegen ook te veranderen. Dan zou het ook kunnen zijn dat je. Nu voor 10 jaar demontabel gebouw er neerzet. En over 10 jaar wijzig het bestemmingsplan. Alsnog zet je een grotere hal neer en gebruik je alles wat je nu hebt gemaakt kan je voor een ander gebouw gebruiken.

Speaker 5

Dan zou ik het meer zo bouwen dat je dat hij makkelijk uitbreidt af.

Speaker 5

Dan zou ik het eerder bouwen, dan zou ik zeggen van, nou, ik zet. Hem zo neer, want Ik kan nu wel even tot hier bouwen die ik niet tot hier. En dan maak ik Misschien wel breder, Omdat je hem In de toekomst zei dan ook een breder gebouw is, maar die zou ik in een keer. Die brede maat inzetten. En dat je later gewoon deze panelen eraf haalt door bouwt en dat je deze panelen bij wijze van spreken weer hier tegen de gevel aan zet.

Speaker 3

Tenzij op je hele park het standaard producten stel iedere hal in dezelfde. Gevel hetzelfde hoogte, zelfde. Dan zou dat wel kunnen, dan zijn we. Wel van de ene plek naar de andere plek.

Speaker 5

Vloer ligt Toch vast?

Speaker 1

En je zegt dus ook dat het gewoon de Arbeid om het uit elkaar te halen ergens opnieuw wil bouwen is. Gewoon nog steeds te duur

Speaker 5

Even mega kostenpost. Ik heb er wel eens eerder aan zitten rekenen.

Naar beneden te halen, en als anders te plaatsen. Terug te zetten en toen klopte, het rekensom gewoon niet?

Speaker 1

Oké in ieder geval daarop voortbouwend, zeg maar wat ik heel erg merk is. Het is vooral kosten zijn te hoog. En, we zien het niet terug in de returns. Dat is ook eigenlijk de eerste aanname die ik een beetje gesteld had aan het begin van mijn onderzoek. Nou een beetje afdwalende van, zeg maar die circulaire ontwikkelingen. Als ik die business case, dan zou ik mijn gebruiken van die. Dus ja, jullie zeggen, de kosten zullen dus omhoog gaan. De returns zullen wellicht iets stijgen Omdat het toch wel

een heel duurzaam gebouw is, minder Energy verbruikt. Maar wat zijn dan andere dingen waardoor je alsnog zeg maar die? Feasible business case op kan krijgen, is dat dat bijvoorbeeld om een heel mooi verhaal bij de invester aan te komen van nou kijk een heel mooi circulair gebouw en dat kan je compenseren met dit en. Dit ja. Of zijn.

Speaker 4

Ja of de juiste investeerder vinden? Die een ander soort waarde hecht

Speaker 5

Wat ik nu nog niet hoor, want. In ons wereldje. Wij zijn als zeg maar, ontwikkelaar belegger zijn we wel heel erg bezig met CO twee neutraal. Maar ik de klant vragen? Die is er nog heel weinig. Ik zie nog maar heel weinig dat een bedrijf zegt Van hé, Ik wil bij wijze van spreken. Albert Heijn, Ik wil een logistieke hal, die moet gewoon super goed scoren op circulariteit. Ik ben er ook bereid om ervoor te betalen Omdat je? Ergens anders moet hij anders ook betalen op het moment dat hij. Dat niet op orde heeft? Het is.

Speaker 4

Ja, Ik denk dat dat een beetje achterloopt nog, want die belastingen zijn nog niet ingezet.

Speaker 5

Wat Misschien dat dat de sspr verhaal? Wat nu speelt?

Speaker 3

Ja, die wordt tweejaarlijks herijkt. En, volgens mij is 2025. De volgende herrijking

Speaker 4

Ja Mensen zijn meestal bereid om meer te betalen wanneer ze dingen echt voelen in hun eigen wereldje en de klant voelt het.Nog niet.

Speaker 4

Ja, en Dat is dus het tenent

Speaker 1

En voornamelijk in logistiek. In de logistieke sector, zegt dan.

Speaker 4

Ja, Ik denk dat controle Misschien niet sneller loopt, maar.

Speaker 1

Maar wat je bij kantoren ook wel een beetje hebt, is een beetje social responsibility van een bedrijfszelf van. We doen heel veel voor duurzaamheid en willen ook een heel duurzaam gebouw zitten.

Speaker 5

Ja, er zitten Natuurlijk ook. Heel veel soft coste, Bijvoorbeeld een houten gebouw kan. Een stukje Welzijn van de kantoor medewerker Verbeteren In de zin dat het Misschien wel lagere ziekteverzuim, dat je daardoor minder kosten maakt en dat je de helft daarvan. Insteekt op, zeg maar een hoge huur,

ja, zouden wij zeggen. Maar het pand morgen neerzetten? Weet dat die manier wordt er ook nog niet gekeken naar vastgoed.

Speaker 4

De anderen dat niet veranderd is het hogere kosten van land en rente. Dus Het is niet dat een bank zegt Van, Oh, ik geef. Hier een lagere rente ofja dat is niet helemaal waar.

Speaker 7

Ja, maar is maar een paar basispunten. Ja, dat klopt. Het is een lokkertje. Het is niet dekkend.

Speaker 4

Maar dat is een belangrijk verhaal.

Speaker 1

Dus Er zijn banken die zeggen van Omdat jij een heel duurzaam gebouw neerzet. Ja ja, krijg je een goedkopere lening.

Speaker 4

Ja en. Ook voor. woninghypotheken. Want ik best wel oneerlijk vind, maar dan zin. Sociaal is dat? Lange termijn denk ik heel. Onhandig voor Mensen die nu. Ja Dat is. Dat is ook goed om denk ik mee te nemen is in in die kostenverhaal zit tijd, dus Als je een hele snelle bouwtijd krijgt, dan Misschien maak je een paar. Meer miljoenen

Speaker 3

Waar je Misschien ook nog aan zou kunnen denken. Ze maatschappelijk belang logistieke sector zit Natuurlijk echt in een. In een zwart perspectief vanuit omwonende gemeentes, anderzijds natuur partijen die die tegen verkeersbewegingen zijn. Maar Als je iets zou kunnen terug betekenen voor de natuur en omgeving. Dan heeft dat wellicht vanuit die. Ook met een beetje meerwaarde om het. Maar het vanuit vanuit maatschappelijk vlak meer draagvlak te kunnen creëren. En Ik denk dat dat nu ook heel aanzienlijk van belang is en dan heb je het nog eens Misschien over gemeentelijke uitbreidingen of tender persoonlijk komende jaren Alleen maar op dat soort vlakken worden ingespeeld

Speaker 4

De andere is land cost

Speaker 1

Die verandert niet.

Speaker 4

Nee, wij gaan nooit land. Verkopen voor een minder hoog prijs. Voor iemand die Het gaat? Ontwikkelen met een duurzaam gebouw.

Speaker 4

Maar de gemeente zou dat wel kunnen doen maar doet dat niet Dan, Ik vind eigenlijk dat ze dat.Zou moeten doen.

Speaker 4

Of je lieshold is gewoon minder. Omdat je blablablabla allemaal gehaald, ja.

Speaker 5

Voor de gemeente stak ook gewoon een verdiende.

Speaker 4

Ja tuurlijk ja. Maar goed, zij willen ook dat. Zij zijn de enige die dit Misschien zouden kunnen doen.

Speaker 1

Arment met ja op die manier, ja, en dan zou je die kosten, zeg maar die die extra bouwkloste zou je kunnen dekken Omdat land prijs dan goedkoper is? Niet deels, maar.

Speaker 5

De gemeente zou heel veel kunnen doen voor sociale woningbouw op het moment dat ze de landenprijs enorm omlaag brengen. Voordat sociale deel, want daarmee zou je dus een veel. Klop je busniess case veel sneller, waardoor je een. Lagere huurprijs kan aanbieden. Op het moment. Dat je de land prijs hoog houdt? En, vervolgens kun je maar. Weinig huur vragen, ja heb. Ja, ik ging business case. Ja mag geen opvallende is dat geen gemeente daarop aan het sturen is.

Speaker 4

Ja dus Als je kosten een beetje uitbreekt, dan heb je tijd, land kosten, rente. Hard, kosten en softkost. Tijd is vaak bouwtijd en en eerder huurinkomsten en Dat is relevant voor een investeerder die.

Nou ja, bijna elke investeerder? Ja. Land is gewoon vaak een heel groot onderdeel van je kostenplaatje. Samen met hard kosten en rente voor je over een hele lange tijd.

Speaker 5

Ja, je hebt nu met. Name zoom je in op logistiek, hè, met jouw onderzoek

Speaker 1

Gebruik je dus die ene case van K 3851 3852 en daar is het land al van het INVESTMENT FUND

Speaker 3

Ja dan land is van huurder. En wij erfpachten, het van van huurder

Speaker 1

Mij ja volgens mij inderdaad, Het is een beetje wat kettingen. Ook zei over wat ik daar eigenlijk mee bedoel is. van The Investment fundheeft Natuurlijk al een hele grote portfolio. En er zitten Natuurlijk investeerders. 8 creatie bijvoorbeeld heel erg stuur. Op van nou. We willen meer dat jullie duurzaam en dat soort dingen, en dan zou portfolio zeg maar. Dat zon ja ontwikkeling daar beter op zou aansluiten.

Speaker 3

Ik kan me ook voorstellen vanuit. De PERE invesor strategie in 2040 zero carbon eigendommen tel hebben.

Zoals vanuit die hoek, Omdat je corporate keuze hebt gemaakt, zal er ook. Wat meer gekoesterd en zoals we dat er meer bedrijven zijn, die dat.

Speaker 1

Wat Misschien nog wel een dingetje is, zouden jullie stel. Je zou er een logistiek gebouw neerzetten, een circulair gebouw neerzetten. Zouden jullie dan in je business case een? Een hogere extra yield kunnen toepassen.

Speaker 4

Je bedoelt lager?

Speaker 1

Ja lager zo een hoger getal uiteindelijk maar een lage percentage.

Speaker 4

Nee niet op dit moment. Nee, niet heel significant.

Speaker 1

En, wat zou daar precies dan de reden voor zijn? Dat dat gewoon teveel risico aan zit, Omdat?

Speaker 4

Nou ja. Ja je ziet gewoon niet per se de markt dat iemand nu bereid is om meer. Te betalen voor een Sustainable? Logistiek gebouw, Maar ik denk wel dat dat gaat komen als er allemaal belastingen zijn die waar je later om voor moet betalen en allerlei andere dingen. En dan zouden wij echt wel meer betalen aan de voorkant zo.

Speaker 5

Interessant om te vragen, jij krijgt die vraag terug voor plot m Van, Waarom zit er nu geen BREEAM Excellent op en je. Zou kunnen vragen. Waarom? Waarom komen jullie met die vraag? Zien jullie dan extra inkomsten ergens?

Speaker 3

Ja, die hebben wij ook teruggeven die wij ook teruggekregen voor voor het voor. Even kijken van het bouwen van je kantoorgedeelte in hout. Daar zouden ze eventueel wel willen meebewegen in hogere kosten. Alleen ze gaven niet echt de concreet. Hoe ver ze willen? Gaan bij mij.

Speaker 5

Ik heb iniedergeval binnen de organisatie PERE invesor een saadje gelegd gelegd In de zin dat er nu voor mij een presentatie rondgaat. Over houtbouw. Dus of ze of ze gaan wennen aan de prijzen. Of dat toch iemand een keer? Terugkomt en die zegt Van ja. Maar ik zie er wel en? Een verdien modelletje in op een of andere manier op die in die manier. Kunnen we geld verdienen? Maar Misschien is er nog meer hoop dan wijsheid.

Speaker 4

Ik kan wel even een Speaker 2 een teams sturen en vragen of hij al ziet hij het markt wat lager die als wordt betaald worden.

Speaker 1

Een heel duurzaam gebouw, ja? Want Dat is Natuurlijk wel een beetje het magische nummertje waar je die business case wel haalbaar mee kan makne

Speaker 3

van Research zou je ook kunnen?

Ik weet niet wat Misschien de mogelijkheid is. Die had toen een onderzoek uitgebracht over kantoorgebouwen dat daar wel meer betaald wordt bij een hogere duurzaamheidslening.

Speaker 1

Ja, dat heb ik in jullie natuur ook heel erg vonden, want het verschil tussen heel erg per sector en bij Office gebouwen zijn er echt in ieder geval voornamelijk een gecertificeerd Office gebouw en dan BREEAM excellent of LEAD en Energy star. Dat er echt Mensen bereikt dat dat echt percentages tussen de 15 en 20% zijn, dat Mensen extra bed zijn om daar voor te betalen, dus.

Speaker 5

Dat is een significant verschil.

Speaker 1

Dat is echt een significant verschil, Maar dat is bij logistiek. En in ieder geval PERE investor heeft het zelf daar ook Research in gedaan, waar ze dus gemiddeld komt en dan op een rand premium van 6%. Zijn logistiek zit daar Misschien heel erg onder, ook ook Omdat wat je dus net al zei dat logistiek is al heel erg op de allerlaagste kosten zit. En iets van bijvoorbeeld restwaardes?

Speaker 7

Restwaarde van Van wat?

Speaker 1

Van de materialen In het gebouw.

Speaker 7

Dat wordt allemaal nog niet zo. Over nagedacht oké. Dus Dat is mijn afdronk?

Speaker 1

Ook Omdat het Misschien te ver In de toekomst is.

Speaker 7

Dat is het probleem van beschikbaarheid niet groot genoeg is als je op een gegeven moment helemaal geen staal meer kan kopen. Op een gegeven moment kan het waardevoller worden maar op dit moment kan je overal nog staal kopen.Dit is gewoon marktwerking beschikbaarheid is nog voldoende, dus ja. Waarom zou je de moeite nemen om die stalen balken eruit halen?

Speaker 3

Dank je. Meneer spontaan te binnen schiet is Misschien ook bouwleges, Maar dat zie je nu nog geen enkele gemeente terug. Maar dat zou wel een interessante stap zijn voor gemeentes. Het is een inkomstenbron.

Speaker 7

Is inkomstenbron, die gaan zich niet aanpassen.

Speaker 5

Het is ook volgend. Jaar wel beneden om te gaan? Met de wet kwaliteitsborging.

Speaker 4

Heb jij eigenlijk al gebeld met ESG team?

Speaker 1

Ik heb, Ik heb een keer heb ik bij een meeting gezeten, Maar dat ging niet over mijn onderzoek.

Speaker 4

Je kan wel even kijken of want? Ja, Ik kan wel even kijken of iemand. Want Ik denk dat sommige van deze vragen. Ook goed zijn om. Mensen te vragen die buiten dit kantoor zitten, die echt In het werk zit.

Speaker 7

Ja, Ik denk dat hij sowieso ook nog even moet Development director moet sparen.

Speaker 5

Speelt volkomen weet ik nu met. Misschien niet met Hello, Misschien met ESG director

Speaker 1

Hij weet wel van mijn onderzoek af Wel, want hij weet wel van mijn onderzoek af in ieder geval me toen wel voorgesteld aan. Hem in ieder geval, oké.

Speaker 5

Je zou hem even hij? Zat wel altijd open voor de vraag, waarvan? Je ook Ik wil. Even 10 minuten met je sparren? Kun je me dan daarna aan de de juiste richting opsturen met een in contact brengen met de juiste man of vrouw?

Speaker 4

Ja ik ken. Esg director, niet genoeg om dat te gebruiken.

Speaker 5

Ja, Hij is gewoon een heel. Hij is, Hij is heel. Heel, heel vriendelijk gewoon. En ook bereid om andere te helpen, zeker met me dringend op dit onderwerp. Heel benaderbaar, zo moet het zeggen. En ook eerlijk in. De zin van op het moment? Dat dat het hem niet past in? Tijd, of zal hij dat? Ook iemand zijn. Men zal je altijd helpen? Als er iemand is die heel correct en netjes is. En dan is het ESG director

Speaker 4

OK. Ik email gewoon hebben tegelijkertijd.

Speaker 1

Oké, dus algemeen is zeg Maar de kosten zien jullie de grootste. Probleem in, Het is gewoon op dit moment. Gewoon nog of. Opbrengt ja of opbrengt ja, nou ja, die zijn Natuurlijk heel erg verbonden aan elkaar. Ja.

Speaker 3

Ja of de opbrengsten

Speaker 4

Nou ja. Ik denk dat dat snel gaat veranderen. Ik denk dat Mensen meer gaan betalen Omdat ze dit berekening doen we nu ook voor nobo van. Ja uiteindelijke huur is Misschien best wel vergelijkbaar Omdat je hebt gespaard aan je Energy.

Speaker 1

Precies en dat Ik had wel gevonden. Wel in niet Natuurlijk dat het in Nederland vinden ze dat wel echt. De huurder ziet dit als een totaal huur en Als de energiekosten naar beneden gaan, Maar de huur gaat omhoog en Dat is uiteindelijk, komt het ongeveer op hetzelfde getal uit, dan vinden zij dat ze hetzelfde betalen.

Speaker 4

Er dan uitkomt denk ik, ja, ja, maar net zoals je nu voor een woning gaat zoeken en jij denkt van oké, Ik ga huren. Nou ja, bijvoorbeeld ik deed dit juni vorig jaar januari februari, toen was ik aan het kijken naar appartementen in standaard woningtype van 1930. Energiewaarde, D huur boven de 1700.

Speaker 1

Ja als het niet erger is

Speaker 4

En toen keek ik naar sodo, dus in ons gebouw in Noord. Ik wil de huur gemiddelde huur, geen idee, Maar de de huren waar ik dus naar keek for one bedroom niet te duur de laagste was 16 50. Ik denk dat was eigenlijk 3 net en die waren direct van de markt af en dan best wel veel rond de 1790 en 2000. Mijn energiekosten waren zo laag, dat uiteindelijk wist ik van oké, Ik ga 1800 betalen voor een ja negentiendertig woning hier. Of ik keek ook naar een paar van 2100, want je komt gewoon niet tussen. De markt maar goed. Plus energiekosten, die uiteindelijk richting de 150. Gaan op water. En in sodo, ik zou denk ik volgens mij Alleen maar van mijn bijna bij wijze van voor mijn internet Alleen maar. Moeten betalen, Dat is. Dan onder de ja minder dan de helft.

Speaker 4

Toen dacht ik, oké, dan is het echt niet logisch om. Zoveel te betalen voor huren In de middel van Amsterdam in een ijskoude appartement. Met enkel ramen en. Ja, Ik denk dat huurders ook gewoon voor woningen kijken naar wat is mijn uiteindelijke maandelijkse bedrag en niet.

Speaker 4

Dat kwam ook Omdat Energy opeens heel duur werd en toen werd het relevant voor hun en toen gingen ze alles berekenen.

Speaker 1

Ja precies. Nou, Als we even teruggaan naar mijn deelvraag, en Dat was echt, zeg maar. Wat zijn nou de Challenges en Considerations dus nou, Ik heb de kost en returns gehoord. Ja kortere bouw bouwduur, maar ook market. Development, zeg maar. Uiteindelijk gaan we meer richting naar dit toe en dan moet het Misschien wel. Duurzaamheid heb ik gehoord en dan ook zeg maar. Strategic portfolio managementt is het echt van? Waar ziet het fonds het meeste waarde in ziet ze bereid om wellicht een lager rendement te accepteren voor een heel duurzaam gebouw. Hebben jullie daar Misschien nog dingen aan toe te voegen?

Speaker 5

In theorie. Zou het kunnen dat het interessant is om. Een soort flagship Pand te hebben wat heel duurzaam is. Wat meer heeft gekost? Om te kunnen zeggen van kijk eens hoe duurzame wijzijn, terwijl de rest allemaal normaal is.

Speaker 7

Ja, maar dan is het de effort is PR.

Speaker 5

Het enige wat ik wel kan bedenken? Alle knopjes waar je aan kon draaien heb je gedaan.

Speaker 1

Oké, nou ja, dan in ieder geval deze week zal ik dan een beetje verder gaan met het maken van een business case en een visibility.

Speaker 7

het leukste werk.

Speaker 1

Ja en dan, uiteindelijk moet ik dat gaan presenteren aan het fonds. En dan ben ik benieuwd hoe die gaan reageren

Ja, echt letterlijk dat ze zeggen. Ik ga ze die condities presenteren en die nieuwe case en daar wil ik echt. Ja, waarschijnlijk zullen aan hetzelfde zeggen wat jullie zeggen, Maar dat is dan wel inderdaad. Het resultaat op mijn hoofdvraag. Van welke condities moeten er veranderen? Dan weten we bijvoorbeeld nou. De kosten moeten naar beneden, of. Er moet meer waarde gehecht worden aan duurzaamheid en uit deze focusgroep in ieder geval wat ik nu dan ook al een beetje hoor, zijn er best wel nog wat andere condities die ik hier aan toe kan voegen. En Ik wil echt van en Dat is denk ik Misschien wel het mooiste resultaat om een hoofdvraag van echt van echt van de Mensen die uiteindelijk dus beslissen gaan jullie geld geven? Je mogen ontwikkeling doen die dan echt zeggen, nou ja, op deze condities vinden wij de businesscase niet feasible. Dus Ik ben benieuwd wat We gaan zeggen. Ik denk dat ik het wel weet, maar. Er zijn er nog dingen bij het fonds wat jullie hebben. Jullie doen veel met via the INVESTMENT FUND. Wat doen jullie eerder hebben gezien waar ze veel waarde aan hechten? In ieder geval bij plot Emmen zijn jullie Natuurlijk. Ze komen er nu in een keer wel van. Daar hadden we wel maar premium excellent gedaan.

Speaker 4

Ja, ik bedoel, Dat was niet een een negatieve sfeer ofzo dat dan?

Speaker 1

Nee precies, maar Waarom hebben we dat niet genoemd? Ja.

Speaker 4

Het is ook niet dat ik duidelijk heb. Hoeveel de kosten nu zouden zijn, Als je het. Terug naar z zou ze anyway, Het was een casual call om onze precies. Maar het was wel net nadat We hadden getekend voor het. Met de aannemer dat ze zeiden ook, Waarom hebben we niet de kantoren gedeelte in hout gedaan? En Dat was. Ook met wetende in hun achterhoofd. Het gaat meer kosten dat dat nooit zou optellen, dus Dat was meer een een marketing of de investeerders te pleasen.

Speaker 5

Maar verhoudingsgewijs kan dat wel interessant zijn, want. Natuurlijk deel kantoor ten opzichte van je hal is Natuurlijk altijd vele malen kleiner, dus Als je daar een Koster quiz hebt. Dan werkt het minder door een. Misschien wel een keer. Misschien wel een keer interessant om het door te rekenen?

Speaker 4

Ja en bij plot m en die controle, je ziet het daar. Die kantoren zijn echt een soort losse blokjes

Dus ja. Verder bij plot m zien we gewoon dat. Dat zijn breeam label willen. Verder zijn ze niet echt. Veel aan de vragen, Maar ik merkt wel, de conversaties veranderen wel ten opzichte van 3 jaar geleden. Het is nu In het conversatie en dat komt Omdat het vanuit de investeerder komt.

Speaker 1

Oké interessant.

Speaker 4

Dus Daarom denk ik dat hij dat ingrediënt van investor is. Het bepalende factor van hoeveel geld Je moet verdienen. En dat. Verandert alles aan die hele rekensom, want het bepaalt dan Oh moet ik hier zitten of moet ik daar zitten? Kan ik, ja kan ik een return maken van 4% of moet het meer richting de 15 zitten? Dus die sturen het hele verhaal.

Speaker 1

In ieder geval, Ik denk dat ik gewoon in ieder geval wel een beetje. Genoeg heb Ik denk dat de aankomende week toch nog wel een paar keer terugkomen bij sommige van jullie nog wat extra vragen te stellen, Maar dat?

Ja, Dat was het dan wel een beetje voor. Voor dit nu zo. Yes, jullie ook bedankt.

D

Circular development – financial feasibility

Asset Assumptions

Unit	New DC
Land	27.300
Coverage Ratio	60%
WH	16.500
Office	250
Office as % of WH	1,5%
Mezz	2.270
Mezz as % of WH	13,8%
Parking units	0 units
Solar	13.200
Value PSM	135,49023

Dates

Description	Start (BOM)	End (EOM)	Duration m
Price date	1 Jun 2023		
Cash Flow Start/Acq	1 May 2023		
Construction	1 Mar 2024	31 Aug 2025	18
ERV	1 Sep 2025	30 May 2033	
Hold period (y)	1 May 2023	30 May 2033	10
Indexation leasehold	1 Mar 2024	31 Aug 2025	18
Indexation construction	1 Jun 2023	30 Nov 2024	18
Indexation rent	1 Jun 2023	31 Aug 2025	27

Revenue

Revenue Assumptions

Item	% of income	GFA	Efficiency	LFA or #	ERV PSM	ERV/Month	ERV/Year
Warehouse	85%	16.500	95%	15.675	79,0	103.194	1.238.325
Office	2%	250	90%	225	130,0	2.438	29.250
Mezzanine	6%	2.270	95%	2.157	40,0	7.188	86.260
Total ERV (today)	**93%**	**19.020**	**95%**	**18.057**	74,98	**112.820**	**1.353.835**
Solar	7%	13.200	100%	13.200	7,3	7.999	95.993
Total ERV incl. Solar (today)	**100%**	**19.020**	**95%**	**18.057**	**80,3**	**120.819**	**1.449.828**

Revenues	%	Months	PSM	Total	
ERV incl. Solar (today)			80	1.449.828	
Indexation ERV (incl. Solar)	2,50%	27	4,6	82.830	
ERV gross of LH (at completion)				**1.532.658**	
Leasehold Cost (today)	4,50%		6,10	166.450	11,5%
Indexation Leasehold	2,50%	27	0	4.161	
ERV net of LH (at completion)			**75**	**1.362.047**	
Operating Expenses	10,00%		8	136.205	
NOI (at completion)			**68**	**1.225.842**	
Gross exit yield (net of LH)				5,00%	
Gross income from Sale			**1.509**	**27.240.942**	
Closing Costs	0,92%		14	250.000	
Net income from Sale			**1.495**	**26.990.942**	

Costs

Costs (at start construction)			
Land Prep		**PSM**	**Total**
Demolition (incl. asbestos)		39,5	1.078.785
Land Preparation		1,8	50.000
Total Land Prep Costs		**41**	**1.128.785**
Hard Costs		**PSM**	**Total**
Foundation		525,0	9.985.663
Primary construction: Foundation, structure, Fa		-	incl
Secondary construction		-	incl
Finishes		-	incl
External area		-	incl
Installation systems		101,3	1.926.250
Utilities		9,5	180.000
Other		-	0
Total Hard Costs		**635,7**	**12.091.913**
Soft Costs GC		85,1	1.619.536
Additional costs (solar)		48,2	916.667
Contingency HC	3,0%	23,1	438.843
Total Hard Costs incl. Cont.		910,99	**17.327.002**
Soft Costs	**%**	**PSM**	**Total**
Leges	2,70%	24,6	467.829
Main advisors	5,0%	45,5	866.350
Other		2,6	50.000
Total Soft Costs		**73**	**1.384.179**
Indexation	3,00%	102	1.945.515
Contingency (TPC)	2,0%	22	413.134
DMF Fee	4,0%	47	887.945
Total Construction Costs		**1.214**	**23.086.560**
Other Development Costs	**%**	**PSM**	**Total**
Leasing Costs	15,0%	11	217.474
Leasehold costs		0	0
Tenant Incentives		0	0
Financing Costs	6,25%	45	850.021
Total Development Costs		**1.270**	**24.154.055**
Land Acquisition Costs	**0**	**0**	**0**
Closing Costs	0	0	0
Total Project Costs	**0**	**1.270**	**24.154.055**
LFA	18.057	1.338	24.154.055

Profit

Profit Analysis	# of Months	PSM LFA	Total
ERV gross of LH (at completion)	27 months	85	1.532.658
ERV net of LH (at completion)	27 months	75	1.362.047
NOI (at completion)	27 months	68	1.225.842
Gross exit yield (net of LH)			5,00%
Gross income from Sale		1.509	27.240.942
Net income from Sale		1.495	26.990.942
Total Project Costs		1.338	24.154.055
Profit on Sale (pre-tax)		157	2.836.887
Tax on Profit	25,8%	41	731.917
Profit on Sale (post-tax)		117	2.104.970

Gross Development Yield		
Untrended Development Yield	**6,53%**	*ERV incl. Solar (today) / (Total Project Costs - Indexation)*
Gross exit yield (net of LH)	5,00%	
Untrended Development Spread	153 bps	
Trended Development Yield	**6,35%**	*ERV gross of LH (at completion) / Total Project Costs*
Gross exit yield (net of LH)	5,00%	
Trended Development Spread	135 bps	
Development Yield (net of leasehold)		
Development Yield	**5,78%**	*(ERV incl. Solar (today) - Leasehold Cost (today)) / (Total Project Costs - Indexation)*
Gross exit yield (net of LH)	5,00%	
Untrended Development Spread	78 bps	
Trended Development Yield	**5,64%**	*ERV net of LH (at completion) / Total Project Costs*
Gross exit yield (net of LH)	5,00%	
Trended Development Spread	64 bps	
Net Development Yield		
Trended Development Yield	**5,08%**	*NOI (at completion) / Total Project Costs*
Net exit yield	4,50%	*NOI (at completion) / Gross income from Sale*
Trended Development Spread	58 bps	
Profit on Cost (pre-tax)	**11,74%**	
Profit on Cost (post-tax)	**8,71%**	

Changes in relation to base case

Increased hard cost with 15%	15%

Sensitivity analysis on After Tax Levered IRR

		ERV PSM						
	9,23%	-10%	0	+3%	+5%	+8%	+10%	+15%
		67,48	74,98	77,23	78,73	80,98	82,48	86,22
-10%	819,9	8,86%	11,23%	11,90%	12,33%	12,97%	13,38%	14,39%
0	911,0	6,87%	9,23%	9,89%	10,32%	10,95%	11,36%	12,36%
+5%	956,5	5,94%	8,30%	8,96%	9,39%	10,01%	10,42%	11,42%
+7%	974,8	5,58%	7,94%	8,60%	9,02%	9,65%	10,06%	11,05%
+10%	1.002,1	5,05%	7,41%	8,07%	8,49%	9,12%	9,53%	10,52%
+15%	1.100,0	3,26%	5,61%	6,27%	6,70%	7,32%	7,73%	8,72%

Sensitivity analysis on Trended Development Yield

		ERV PSM						
	5,64%	-10%	0	+3%	+5%	+8%	+10%	+15%
		67,48	74,98	77,23	78,73	80,98	82,48	86,22
-10%	819,9	5,55%	6,20%	6,39%	6,52%	6,71%	6,84%	7,17%
0	911,0	5,05%	5,64%	5,82%	5,93%	6,11%	6,23%	6,52%
+5%	956,5	4,83%	5,40%	5,56%	5,68%	5,85%	5,96%	6,24%
+7%	974,8	4,75%	5,30%	5,47%	5,58%	5,75%	5,86%	6,13%
+10%	1.002,1	4,63%	5,17%	5,33%	5,44%	5,60%	5,71%	5,98%
+15%	1.100,0	4,25%	4,75%	4,90%	5,00%	5,15%	5,24%	5,49%

Sensitivity analysis onAfter Tax Levered IRR

		Gross Exit yield						
	9,23%	+0,10%	0	-0,05%	-0,10%	+0,15%	+0,20%	+0,25%
		5,10%	5,00%	4,95%	4,90%	4,85%	4,80%	4,75%
-10%	819,9	10,97%	11,23%	11,37%	11,50%	11,64%	11,78%	11,92%
0	911,0	8,96%	9,23%	9,37%	9,50%	9,64%	9,79%	9,93%
+5%	956,5	8,02%	8,30%	8,44%	8,58%	8,72%	8,86%	9,01%
+7%	974,8	7,66%	7,94%	8,08%	8,22%	8,36%	8,50%	8,65%
+10%	1.002,1	7,13%	7,41%	7,55%	7,69%	7,83%	7,98%	8,12%
+15%	1.100,0	5,33%	5,61%	5,76%	5,90%	6,05%	6,19%	6,34%

Hold Period	10,00	years														
		start	duration (months)	end												
Date					***Total***	**01/05/2023 31/05/2023**	**01/06/2023 31/05/2024**	**01/06/2024 31/05/2025**	**01/06/2025 31/05/2026**	**01/06/2026 31/05/2027**	**01/06/2027 31/05/2028**	**01/06/2028 31/05/2029**	**01/06/2029 31/05/2030**	**01/06/2030 31/05/2031**	**01/06/2031 31/05/2032**	**01/06/2032 31/05/2033**
Year	01/05/2023					0	1	2	3	4	5	6	7	8	9	10
Hold	10					0	1	1	1	1	1	1	1	1	1	1
Exit	31/05/2033					0	0	0	0	0	0	0	0	0	0	1
Land Costs																
Purchase Price (based on RLV)	-	01/05/2023			-	-	-	-	-	-	-	-	-	-	-	-
Closing Costs (incl DD)	-	01/05/2023			*-250.000*	-250.000	-	-	-	-	-	-	-	-	-	-
RETT	0,0%				-	-	-	-	-	-	-	-	-	-	-	-
VAT Due at Closing (if applicable)	0,0%	-			-	-	-	-	-	-	-	-	-	-	-	-
Land Costs					***-250.000***	**-250.000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Index Check							*0,00%*	*0,00%*	*1,04%*	*3,23%*	*5,73%*	*8,23%*	*10,73%*	*13,23%*	*15,73%*	*18,23%*
Revenues																
ERV (including solar)	1.532.658	01/09/2025	94	30/06/2033	*11.878.100*		-	-	1.149.494	1.532.658	1.532.658	1.532.658	1.532.658	1.532.658	1.532.658	1.532.658
Rental Growth	2,50%				*1.163.064*		-	-	11.974	49.492	87.809	126.125	164.441	202.758	241.074	279.391
Structural Vacancy	0,00%				-		-	-	-	-	-	-	-	-	-	-
ERV Solar					-		-	-	-	-	-	-	-	-	-	-
Rental Growth					-		-	-	-	-	-	-	-	-	-	-
Structural Vacancy	0,00%				-		-	-	-	-	-	-	-	-	-	-
Total ERV					***13.041.164***		**-**	**-**	**1.161.467**	**1.582.150**	**1.620.467**	**1.658.783**	**1.697.100**	**1.735.416**	**1.773.732**	**1.812.049**
Opex	10,00%				*-1.304.116*	-	-	-	-116.147	-158.215	-162.047	-165.878	-169.710	-173.542	-177.373	-181.205
Land Lease	€ 170.610,99				*-1.706.110*	-	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611	-170.611
Land Lease Indexation	2,50%				*-129.469*	-	-	-	-1.333	-5.509	-9.775	-14.040	-18.305	-22.570	-26.836	-31.101
Non-Residential Opex	10,00%				-	-	-	-	-	-	-	-	-	-	-	-
Non-Residential Land Lease	€ -				-	-	-	-	-	-	-	-	-	-	-	-
Non-Residential Land Lease Indexation	2,50%				-	-	-	-	-	-	-	-	-	-	-	-
Total Opex & Leasehold					*-3.139.695*	-	-170.611	-170.611	-288.091	-334.335	-342.432	-350.529	-358.626	-366.723	-374.820	-382.917
NOI					***9.901.469***	**-**	**-170.611**	**-170.611**	**873.377**	**1.247.815**	**1.278.034**	**1.308.254**	**1.338.473**	**1.368.693**	**1.398.913**	**1.429.132**
Capex																
Asset Management Fee	0,75%					-	-	-	-	-	-	-	-	-	-	-
Annual Capex 1	5,00%	31/05/2027	73	30/06/2033	*-406.075*	-	-	-	-	-	-63.902	-65.413	-66.924	-68.435	-69.946	-71.457
Annual Capex 2	0,00%	31/05/2028	61	30/06/2033	-	-	-	-	-	-	-	-	-	-	-	-
Total hard cost	20.401.302	01/03/2024	18	31/08/2025	*-19.267.896*	-	-3.400.217	-13.600.868	-2.266.811	-	-	-	-	-	-	-
Soft Costs	1.384.179	01/03/2024	18	31/08/2025	*-1.307.280*	-	-230.697	-922.786	-153.798	-	-	-	-	-	-	-
Land + SC + HC Contingency	2,00%				*-416.504*	-5.000	-72.618	-290.473	-48.412	-	-	-	-	-	-	-
DMF (incl contingency, incl LH)	4,00%				*-917.912*	-10.200	-154.966	-599.390	-105.585	-6.824	-6.824	-6.824	-6.824	-6.824	-6.824	-6.824
Leasing Costs	217.474	01/09/2025	1	31/10/2025		-	-	-	-217.474	-	-	-	-	-	-	-
Total Capex					***-22.533.141***	**-15.200**	**-3.858.498**	**-15.413.517**	**-2.792.081**	**-6.824**	**-70.726**	**-72.237**	**-73.748**	**-75.259**	**-76.770**	**-78.281**
Total Dev Costs + Land	24.154.055				***-22.159.592***											
Exit																
Gross Exit Yield	5,00%				*32.206.739*		-3.412.220	-3.412.220	19.790.471	28.120.597	28.801.621	29.482.644	30.163.668	30.844.691	31.525.715	32.206.739
Gross Exit Yield	5,00%				-		-	-	-	-	-	-	-	-	-	-
Exit Costs	0,92%				*-295.573*		31.315	31.315	-181.624	-258.073	-264.323	-270.573	-276.823	-283.073	-289.323	-295.573
Total Exit Value					***31.911.166***		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**31.911.166**
VAT Deduction	0,00%				-		-	-	-	-	-	-	-	-	-	-
Total Exit Value after VAT Deduction	**31.911.166**				***31.911.166***		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**31.911.166**
Unleveraged, Pre-Tax, Pre-Fees					***19.029.493***	**-265.200**	**-4.029.109**	**-15.584.128**	**-1.918.704**	**1.240.990**	**1.207.308**	**1.236.017**	**1.264.725**	**1.293.434**	**1.322.142**	**33.262.017**
Equity Invested					***-21.797.140***	**-265.200**	**-4.029.109**	**-15.584.128**	**-1.918.704**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cum. Equity Invested					***-21.797.140***	**-265.200**	**-4.294.309**	**-19.878.436**	**-21.797.140**	**-21.797.140**	**-21.797.140**	**-21.797.140**	**-21.797.140**	**-21.797.140**	**-21.797.140**	**-21.797.140**
IRR	8,86%															
EM	1,87															
CoC	4,22%						*-3,97%*	*-0,86%*	*4,01%*	*5,72%*	*5,86%*	*6,00%*	*6,14%*	*6,28%*	*6,42%*	*6,56%*
CoC (post-completion)	5,87%								*4,01%*	*5,72%*	*5,86%*	*6,00%*	*6,14%*	*6,28%*	*6,42%*	*6,56%*
Leverage																
Facility I - Acquisition																
Beginning Balance	50,00%						125.000	124.479	123.958	-	-	-	-	-	-	-
Draw Down	01/05/2023	3,00	years		***125.000***	125.000	-	-	-	-	-	-	-	-	-	-
Amortization - amounts	5,00%				*-1.563*	-	-521	-521	-521	-	-	-	-	-	-	-
Bullet Repayment	31/05/2026				***-123.438***	-	-	-	-123.438	-	-	-	-	-	-	-
Ending Balance						125.000	124.479	123.958	-	-	-	-	-	-	-	-
Arrangement Fee	1,00%				*-1.250*	-1.250	-	-	-	-	-	-	-	-	-	-
Other Running Costs	0,00%				-	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee (on remaining balance)	0,50%				-	-	-	-	-	-	-	-	-	-	-	-
Undrawn Debt						-	-	-	-	-	-	-	-	-	-	-
Interest - amount	6,50%				*-24.273*	-	-8.125	-8.091	-8.057	-	-	-	-	-	-	-
Debt Cash Flow - Facility I					***-132.016***	**123.750**	**-8.646**	**-8.612**	**-132.016**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Facility II - Capex																
Beginning Balance	50,00%						7.600	1.920.708	9.547.103	-	-	-	-	-	-	-
Draw Down	01/05/2023	3,00	years		***9.643.607***	7.600	1.929.249	7.706.758	-	-	-	-	-	-	-	-
Amortization - amounts	10,00%				*-176.867*	-	-16.140	-80.363	-80.363	-	-	-	-	-	-	-
Bullet Repayment	31/05/2026				***-9.466.740***	-	-	-	-9.466.740	-	-	-	-	-	-	-
Ending Balance						7.600	1.920.708	9.547.103	-	-	-	-	-	-	-	-
Arrangement Fee	1,00%				*-96.436*	-96.436	-	-	-	-	-	-	-	-	-	-
Other Running Costs	0,00%				-	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee (on remaining balance)	0,50%				*-38.534*	-	-38.534	-	-	-	-	-	-	-	-	-
Undrawn Debt						-	7.706.758	-	-	-	-	-	-	-	-	-
Interest - amount	6,50%				*-745.902*	-	-494	-124.846	-620.562	-	-	-	-	-	-	-
Debt Cash Flow - Facility II					***-10.167.665***	**-88.836**	**1.874.081**	**7.501.549**	**-10.167.665**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Facility III - Refinance																
Beginning Balance	9.590.177						-	-	-	9.590.177	9.590.177	9.590.177	9.590.177	9.590.177	9.590.177	9.590.177
Draw Down	31/05/2026	7,00	years		***9.590.177***	-	-	-	9.590.177	-	-	-	-	-	-	-
Amortization - amounts	0,00%				-	-	-	-	-	-	-	-	-	-	-	-
Bullet Repayment	31/05/2033					-	-	-	-	-	-	-	-	-	-	-9.590.177
Ending Balance						-	-	-	9.590.177	9.590.177	9.590.177	9.590.177	9.590.177	9.590.177	9.590.177	-
Arrangement Fee	1,00%				-	-	-	-	-	-	-	-	-	-	-	-
Other Running Costs	0,00%				-	-	-	-	-	-	-	-	-	-	-	-
Commitment Fee (on remaining balance)	0,50%				-	-	-	-	-	-	-	-	-	-	-	-
Undrawn Debt						-	-	-	-	-	-	-	-	-	-	-
Interest - amount	5,50%				*-3.692.218*	-	-	-	-	-527.460	-527.460	-527.460	-527.460	-527.460	-527.460	-527.460
Debt Cash Flow - Facility III						**-**	**-**	**-**	**9.590.177**	**-527.460**	**-527.460**	**-527.460**	**-527.460**	**-527.460**	**-527.460**	**-10.117.637**
Leveraged Cash Flow Pre-Tax, Pre-Fees					***14.430.880***	**-230.286**	**-2.163.674**	**-8.091.191**	**-2.628.207**	**713.531**	**679.848**	**708.557**	**737.266**	**765.974**	**794.683**	**23.144.379**
Equity Invested					***-13.113.358***	**-230.286**	**-2.163.674**	**-8.091.191**	**-2.628.207**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cum. Equity Invested					***-13.113.358***	**-230.286**	**-2.393.960**	**-10.485.151**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**
IRR	10,63%															
EM	2,10															
CoC	3,32%						*-9,10%*	*-2,90%*	*1,87%*	*5,49%*	*5,72%*	*5,95%*	*6,18%*	*6,42%*	*6,65%*	*6,88%*
CoC (post-completion)	5,64%								*1,87%*	*5,49%*	*5,72%*	*5,95%*	*6,18%*	*6,42%*	*6,65%*	*6,88%*
Corporate Income Tax	25,80%	€ 200.000						-	-	-	-	-	-	-	-	-2.580.406
	19,00%	>0,<200,000														
Net Cash Flow Post-Tax					***11.850.474***	**-230.286**	**-2.163.674**	**-8.091.191**	**-2.628.207**	**713.531**	**679.848**	**708.557**	**737.266**	**765.974**	**794.683**	**20.563.973**
Equity Invested					***-13.113.358***	**-230.286**	**-2.163.674**	**-8.091.191**	**-2.628.207**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Cum. Equity Invested					***-13.113.358***	**-230.286**	**-2.393.960**	**-10.485.151**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**	**-13.113.358**
After Tax Levered IRR	9,23%															
After Tax Levered EM	1,90															
After Tax Levered CoC	3,32%						*-9,10%*	*-2,90%*	*1,87%*	*5,49%*	*5,72%*	*5,95%*	*6,18%*	*6,42%*	*6,65%*	*6,88%*
CoC (post-completion)	5,64%								*1,87%*	*5,49%*	*5,72%*	*5,95%*	*6,18%*	*6,42%*	*6,65%*	*6,88%*

E

Presentation Investment fund

Thesis presentation: Circular logistics development

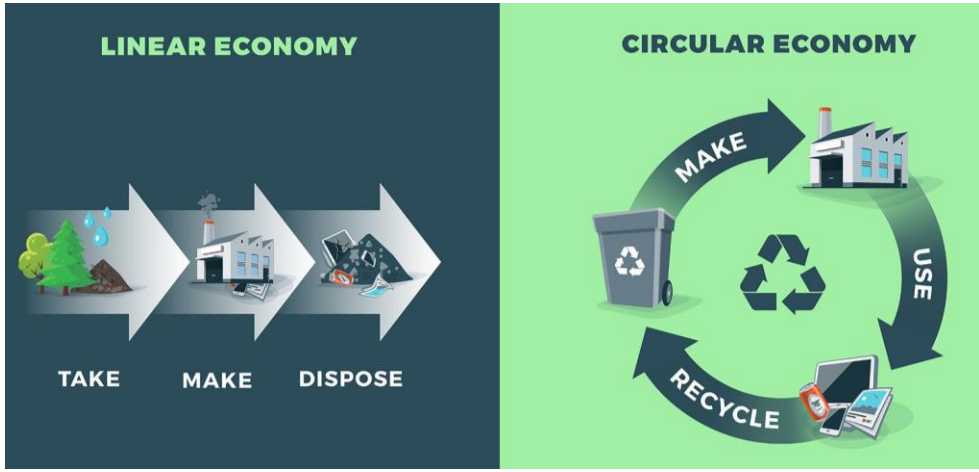
A FEASIBLE BUSINESS CASE FOR A CIRCULAR REAL ESTATE DEVELOPMENT

THESIS OVERVIEW

What is circular real estate development?

Circular real estate

Definition: "Circular real estate means developing, using and reusing buildings, without unnecessarily depleting natural resources, polluting the living environment and damaging ecosystems." It stems from the concept: the Circular Economy.



CIRCULAR REAL ESTATE DESIGN STRATEGIES

Circular construction is often referred to as the recycling of materials, although there are many more strategies. From my research, I made a four-part division of circular design strategies:

- **Refuse:** Refusing environmental harming materials or even refusing new construction.
- **Reuse:** Making effective reuse of exiting materials and recycled ones.
- **Reusable:** Making a building adaptable and demountable for future reuse.
- **Renewable:** Making use of renewable sources such as biobased materials (timber)

Focus research

The hypothesis is that the cost of such a circular (sustainable) asset is not a more profitable investment, when all other assumptions are maintained. This is due to an increase in hard costs, increasing the overall cost basis of the development. My case study therefore focuses on how to create a feasible business case despite a higher cost basis.

RESEARCH QUESTION

"Under what conditions is there a feasible business case for real estate investors to make a positive investment decision on circular real estate development?"

Asset location and development proposal

Logistics development on agro-food production park

Development opportunity of a logistics warehouse following the demolition of the existing assets on plot 3851 and 3852. This serves as an investigative proposal for the development of K3851/52 and is considered a distinct proposal from the one previously suggested in 2023.

DEVELOPMENT CHARACTERISTICS

- Located on the old part the park, plot 3851/52 is the second oldest warehouse on the park
- Asset quality is below current market standard, and is therefore, due for development.
- In June, a repositioning of the road adjacent to the plot was proposed between 3851/52 and 3880. This case study also assumes that the road will be adjusted, so that the base case and circular proposal can be compared properly. This is further explained in slide 6.

Property and deal facts

Key Facts

- Opportunity to develop a new circular c. 19,020 sqm GBA unconditioned circular logistics warehouse following the demolition and reuse of an existing asset on plots 3851/52.

- The land is in Hines ownership via leasehold and the (re)development of the assets were already accounted for in the UW of the FPV acquisition.

- Situated on a 27,300 sqm plot, the development will consist of 16,500 sqm GBA warehouse, 250 sqm GBA office space and 2,270 sqm GBA mezzanine space. Assuming a blended efficiency of 95%, this will result in 18,057 sqm LFA and c. 61% coverage ratio.

- Circular logistics building that reuses the old foundation of the existing building and recycles the remaining materials. Making use of biobased materials such as a wooden structure and biobased isolation. A significant CO2 reduction through the use of biobased materials and geopolymer concrete. Resulting in a BREEAM-NL EXCELENT score and a very low MPG score.

Full address	Plot 3851/52 agro-food production park
Asset type	Land
Asset Subtype	Land Development
Ownership interest	Leasehold
Total net rentable area	19,020 sqm GBA / 18,057 sqm LFA
Buildings (number)	1
Height (floors / ft or m)	c. 11m
Site Area	27,300 sqm
Parking Spaces	c. 70 cars
Year Built/renov.	2025
WALT	10
Preleasing	100%

Circular development opportunity

Circular development Outline

- Demolition of existing logistics warehouse to develop a new circular Logistics warehouse
- The existing materials of the old warehouse are reused for the new development and otherwise recycled.
- The existing foundation is in good condition and is reused for the new development. The origin of the other materials that are used are as much non-toxic and of renewable origin, such as biobased materials (hybrid timber frame) Furthermore, striving for only using geopolymer concrete or otherwise, recycled concrete for lower CO2 production.
- Making use of existing energy grid and applying solar installation. In the building energy efficient systems are used.

Sustainability

Certificating on:

- BREEAM-NL EXCELLENT (assumption)
- Building passport
  - Material Circularity Indicator (MCI)
  - Environmental performance of buildings (MPG)
  - Losmaakbaarheid index (LI) (demountable index)

OTHER SUSTAINABILITY ASPACTS

Significant CO2 reduction through the use of non-toxic and biobased materials.

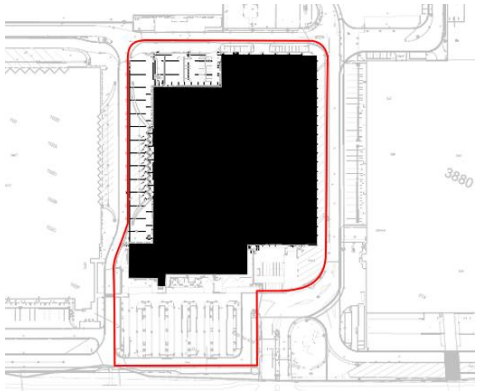
Example figures
Source: https://www.bleckmann.com/press/bleckmann-and-vdr-bouwgroep-build-the-largest-circular-distribution-centre

Detailed circular specifications

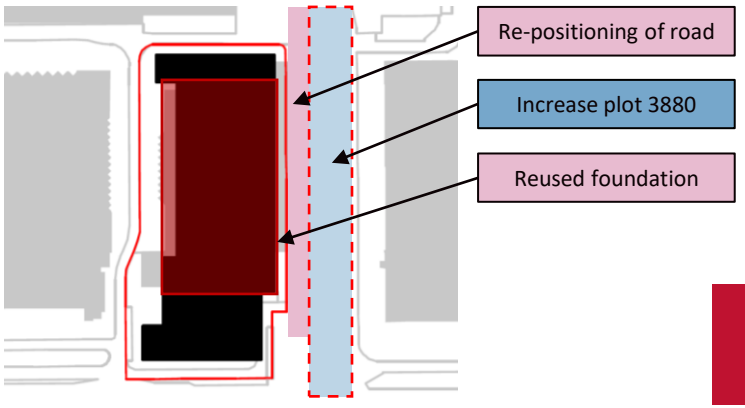
- **Refuse:** Refusing environmental harming materials or even refusing new construction.
- **Reuse:** Making effective reuse of exiting materials and recycled ones.
- **Reusable:** Making a building adaptable and demountable for future reuse.
- **Renewable:** Making use of renewable sources such as biobased materials (timber)

Current Asset	Circular Approach	Circular strategy
Foundation	The current foundation located beneath the new circular redevelopment outline will be reused. Any foundation sections that cannot be reused will be recycled.	Reuse
Floors	The existing floor will have to be replaced by a geopolymer concrete floor (concrete without cement).	Refuse
Column Structure	Due to technical difficulties with the reuse of the steel structure the steel structure is recycled and replaced by a timber structure.	Reuse, renewable
Insulation	Isolation is used from biobased materials such ase isovlas (made from the short fibers from the stems of the flax plant).	Renewable
Facade	Exising glazing panels are reused. Facade consiting of Neolife wood composite.	Reuse, renewable
Finishes	Reused elements suchs as reused doors, floor tiles, and ceiling tiles.	Reuse
Layout	The layout of the circular development is completly made using standardized grid sizes and height. Resulting in a adabtable building for future reuse. This also guarantees that the current materials adhere to standard sizes, enabling their reuse at the end of their lifecycle and maximizing their residual value.	Reusable

Current Asset



Circular Redevelopment



PROPOSED DEVELOPMENT FROM JUNE 2023

Base case traditional development - Key Assumptions and Returns

Budget	Local		%
	Millions (€)	PSF/SQM	
Land/Site	€ 1,1	€ 41	5,3%
Hard Costs (incl. 3% contingency)	€ 15,1	€ 792	70,7%
Soft Costs	€ 1,21	€ 64	5,7%
Indexation	€ 1,70	€ 89	8,0%
DMF Fee (4%)	€ 0,78	€ 41	3,7%
Contingency TPC (2%)	€ 0,36	€ 19	1,7%
Leasing	€ 0,22	€ 11	1,0%
Leasehold	€ 0,00	€ 0	0,0%
Tenant Incentives	€ 0,00	€ 0	0,0%
Financing	€ 0,85	€ 45	4,0%
Total	**€ 21,3**	**€ 1.120**	**100%**

Dev't Assumptions		Exit Assumptions	
Hold period (yrs)	10	Exit Cap rate	5,00%
LTC	50,0%	Sale Price	€ 31,53 M
Avg. Interest Rate	6,50%	Sale Price /[sf/sqm]	€ 1.746
Avg. Lease-up Rent	€ 74,98	Asset/share deal	Share deal
Pre-leasing %	100%	Stab. Occupancy	100%

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (PSM)	€ 1.509	€ 1.746

Investment Returns	Unlevered (pre-tax)	Levered (pre-fees, pre-tax)	Levered (after fees, after tax)
CoC	4,82%	4,31%	4,31%
CoC (PC)	6,70%	7,02%	7,02%
IRR	10,84%	13,61%	11,88%
EM	2,14	2,54	2,25
Profit	€ 21,72 M	€ 17,67 mln	€ 14,40 mln

Base case circular development - Key Assumptions and Returns

Budget	Local		%
	Millions (€)	€ / m²	
Land/Site	€ 1.1	€ 41	4.7%
Hard Costs (incl. 3% contingency)	€ 17.3	€ 911	71.7%
Soft Costs	€ 1.38	€ 73	5.7%
Indexation	€ 1.95	€ 102	8.1%
DMF Fee (4%)	€ 0.89	€ 47	3.7%
Contingency TPC (2%)	€ 0.41	€ 22	1.7%
Leasing	€ 0.22	€ 11	0.9%
Leasehold	€ 0.00	€ 0	0.0%
Tenant Incentives	€ 0.00	€ 0	0.0%
Financing	€ 0.85	€ 45	3.5%
Total	**€ 24.2**	**€ 1,270**	**100%**

Dev't Assumptions		Exit Assumptions	
Hold period (yrs)	10	Exit Cap rate	5.00%
LTC	50.0%	Sale Price	€ 31.53 M
Avg. Interest Rate	6.50%	Sale Price /[sf/sqm]	€ 1,746
Avg. Lease-up Rent	€ 74.98	Asset/share deal	Share deal
Pre-leasing %	100%	Stab. Occupancy	100%

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (€ / m2)	€ 1,509	€ 1,746

Investment Returns	Unlevered (pre-tax)	Levered (pre-fees, pre-tax)	Levered (after fees, after tax)
CoC	4.22%	3.32%	3.32%
CoC (PC)	5.87%	5.64%	5.64%
IRR	8.86%	10.63%	9.23%
EM	1.87	2.10	1.90
Profit	€ 19.03 M	€ 14.43 M	€ 11.85 M

Reasons for Higher Development Costs:

At the moment we are expecting a price increase of 15% in relation to the base case due to:

- Increase in labor due to technical aspects with the application of circular construction
- Increased material prices due to high end sustainability materials

Return sensitivity on circular development

Sensitivity tables

To account for potential fluctuations in investment expenses (hard costs) arising from high sustainability standards in the logistic asset, as well as anticipated adjustments in Estimated Rental Value (ERV), Gross Exit yield, a sensitivity table has been established. This table illustrates variations in After Tax Levered IRR and Trended development yield, providing valuable insights into the financial impact of these changes.

Sensitivity analysis on After Tax Levered IRR

			ERV PSM						
			-10%	0	+3%	+5%	+8%	+10%	+15%
		9,23%	67,48	74,98	77,23	78,73	80,98	82,48	86,22
Hard cost PSM	-10%	819,9	8,86%	11,23%	11,90%	12,33%	12,97%	13,38%	14,39%
	0	911,0	6,87%	9,23%	9,89%	10,32%	10,95%	11,36%	12,36%
	+5%	956,5	5,94%	8,30%	8,96%	9,39%	10,01%	10,42%	11,42%
	+7%	974,8	5,58%	7,94%	8,60%	9,02%	9,65%	10,06%	11,05%
	+10%	1.002,1	5,05%	7,41%	8,07%	8,49%	9,12%	9,53%	10,52%
	+15%	1.100,0	3,26%	5,61%	6,27%	6,70%	7,32%	7,73%	8,72%

Sensitivity analysis on After Tax Levered IRR

			Gross Exit yield						
			+0,10%	0	-0,05%	-0,10%	+0,15%	+0,20%	+0,25%
		9,23%	5,10%	5,00%	4,95%	4,90%	4,85%	4,80%	4,75%
Hard cost PSM	-10%	819,9	10,97%	11,23%	11,37%	11,50%	11,64%	11,78%	11,92%
	0	911,0	8,96%	9,23%	9,37%	9,50%	9,64%	9,79%	9,93%
	+5%	956,5	8,02%	8,30%	8,44%	8,58%	8,72%	8,86%	9,01%
	+7%	974,8	7,66%	7,94%	8,08%	8,22%	8,36%	8,50%	8,65%
	+10%	1.002,1	7,13%	7,41%	7,55%	7,69%	7,83%	7,98%	8,12%
	+15%	1.100,0	5,33%	5,61%	5,76%	5,90%	6,05%	6,19%	6,34%

Sensitivity analysis on Trended Development Yield

			ERV PSM						
			-10%	0	+3%	+5%	+8%	+10%	+15%
		5,64%	67,48	74,98	77,23	78,73	80,98	82,48	86,22
Hard cost PSM	-10%	819,9	5,55%	6,20%	6,39%	6,52%	6,71%	6,84%	7,17%
	0	911,0	5,05%	5,64%	5,82%	5,93%	6,11%	6,23%	6,52%
	+5%	956,5	4,83%	5,40%	5,56%	5,68%	5,85%	5,96%	6,24%
	+7%	974,8	4,75%	5,30%	5,47%	5,58%	5,75%	5,86%	6,13%
	+10%	1.002,1	4,63%	5,17%	5,33%	5,44%	5,60%	5,71%	5,98%
	+15%	1.100,0	4,25%	4,75%	4,90%	5,00%	5,15%	5,24%	5,49%

Note hard cost.

- The hard cost indicated in the sensitivity tables (911,0 psm), reflects a 15% increase from the traditional development base case.

Base case traditional development vs base case circular development

Base case traditional development

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (€ / m2)	€ 1,509	€ 1,746

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.82%	4.31%	4.31%
IRR	10.84%	13.61%	11.88%
EM	2.14	2.54	2.25

Key Facts

- Development cost € 21,3 M (€ 1,120 m^2)
- BREEAM – Very good
- Normal Co2 production for traditional development

Base case circular development

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (€ / m2)	€ 1,509	€ 1,746

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.22%	3.32%	3.32%
IRR	8.86%	10.63%	9.23%
EM	1.87	2.10	1.90

Key Facts

- Total development cost € 24,2 M (€ 1,270 m^2)
- BREEAM – Excellent
- Significant Co2 reduction using circular development specs
- Rent and sale premium associated with circular development, not accounted for in the business case.
  translates to the IRR and developme
  8% rent premium results in similar r

RETURN COMPARISON

Scenario analysis circular development in relation to the ERV

Base case traditional development

Base case development

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.36 M	€ 1.77 M
NOI	€ 1.23 M	€ 1.40 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 27.24 M	€ 31.53 M
Exit Value (€ / m2)	€ 1,509	€ 1,746

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.82%	4.31%	4.31%
IRR	10.84%	13.61%	11.88%
EM	2.014	2.54	2.25

Investment returns	Trended
Development yield	5.64%

Circular development – ERV scenario 1

Increased ERV with 8%

- Tenant is going to pay more due to its own sustainable financials' burdens (CO2 tax, ESG investing).
- The investors appetite of the tenants, desire high sustainability goals.

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.48 M	€ 1.91 M
NOI	€ 1.33 M	€ 1.52 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 29.53 M	€ 34.18 M
Exit Value (€ / m2)	€ 1,635	€ 1,893

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.63%	4.01%	4.01%
IRR	10.13%	12.56%	10.95%
EM	2.04	2.38	2.13

Investment returns	Trended
Development yield	6.11%

Circular development – ERV scenario 2

Increased ERV with 10%

- Where seeing significant ERV increases in office sector for BREEAM excellent buildings, which will translate to logistics.
- Social responsibility of tenant for sustainable building is expected.

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1.51 M	€ 1.94 M
NOI	€ 1.35 M	€ 1.55 M
Exit Yield (gross)	5.00%	5.00%
Exit Value	€ 30.10 M	€ 34.84 M
Exit Value (€ / m2)	€ 1,667	€ 1,929

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4.74%	4.18%	4.18%
IRR	10.44%	13.02%	11.36%
EM	2.08	2.45	2.18

Investment returns	Trended
Development yield	6.23%

Scenario analysis circular development in relation to the Yield

Base case traditional development

Base case development

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1,36 mln	€ 1,77 mln
NOI	€ 1,23 mln	€ 1,40 mln
Exit Yield (gross)	5,00%	5,00%
Exit Value	€ 27,24 mln	€ 31,53 mln
Exit Value (PSM)	€ 1.509	€ 1.746

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4,82%	4,31%	4,31%
IRR	10,84%	13,61%	11,88%
EM	2,14	2,54	2,25

Investment returns	Trended
Development yield	5,64%

Circular development - yield scenario 1

In relation to the **base case circular development:**

- Decreased yield by 0,10%

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1,36 mln	€ 1,77 mln
NOI	€ 1,23 mln	€ 1,40 mln
Exit Yield (gross)	4,90%	4,90%
Exit Value	€ 27,80 mln	€ 32,17 mln
Exit Value (PSM)	€ 1.539	€ 1.782

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4,22%	3,32%	3,32%
IRR	9,09%	10,97%	9,50%
EM	1,90	2,15	1,94

Investment returns	Trended
Development yield	5,64%

Circular development - yield scenario 2

In relation to the **base case circular development:**

- Decreased yield by 0,20%

Valuation	Stabilization (yr 2)	Exit (yr 10)
ERV (less leasehold)	€ 1,36 mln	€ 1,77 mln
NOI	€ 1,23 mln	€ 1,40 mln
Exit Yield (gross)	4,80%	4,80%
Exit Value	€ 28,38 mln	€ 32,84 mln
Exit Value (PSM)	€ 1.572	€ 1.819

Investment Returns	Unlevered (pre-tax)	Levered (after fees, before tax)	Levered (after fees, after tax)
CoC	4,22%	3,32%	3,32%
IRR	9,32%	11,31%	9,79%
EM	1,93	2,20	1,98

Investment returns	Trended
Development yield	5,64%

CONCLUSION

Other potential solutions to investigate

Potential solutions that are not taken into account in this proposal

During a discussion session several other potential solutions emerged

STRATEGIC PORTFOLIO MANAGEMENT

In the current Dutch market, a notable trend is the increasing investment in highly sustainable and circular buildings, despite their lower returns compared to traditional developments. To mitigate these reduced returns, funds frequently combine sustainable investments with other high-return opportunities. By doing so, they can present to their investors that the overall portfolio maintains strong performance levels and incorporates significant sustainability aspects.

INVESTOR APPETITE

Furthermore, alongside the aforementioned trend, there is a growing interest among investors in highly sustainable and circular investments. We are expecting that they are willing to accept lower returns in exchange for enhanced sustainability features. However, if an increase in hard costs renders the overall development financially unviable, alternative options are explored to align with investor preferences.

MARKET DEVELOPMENT

Currently the increased hard cost due to circularity specifications result in an unfeasible business case in relation to a traditional development. Although, due to the expected scarcity in materials and regulations on the reuse of materials, we think that market prices for circular materials will decrease. In the European Union lots of regulation on the circular economy is set in place, which will benefit the business case financially.

CONCLUSION

Circular development

Conclusion

The circular development opportunity reduces the Co2 production of the building significant due to the circular specifications of slide 6. Based on my research I am expecting a rent a sale premium associated with circular constructing. Where now seeing a significant rent premium associated within the UK certified BREEAM Excellent office buildings of around 20%. We assume that this market development will also translate to the logistic sector due to legislation from the government towards our tenants and social responsibility of the tenants. Further financial benefits are subsidies, residual values of the used materials (1) , and reduction in operating cost due to high sustainable materials and demountable construction.

BENEFITS

Circular buildings further benefit.

- **Waste reduction:** Through recycling and reuse of materials, thereby limiting waste production and its impact on the environment.
- **Energy savings:** Through efficient insulation, optimal orientation, and the use of energy efficient heating and cooling systems.
- **Flexibility and modularity:** Provides for flexibility and modularity, facilitating adaptations and transformations to meet the changing needs of occupants and uses.
- **Environmental awareness:** Through innovation and sustainable development, raising public awareness of the importance of preserving health and the environment.
- **Rent and sale premium:** Associate premiums with green buildings and certification according to Hines research(2)
- **Legislation:** In line with EU Taxonomy(3) and EU Green Deal.

COST

- Because of the elevated circularity and sustainability standards, we anticipate a 15% rise in hard costs compared to the traditional base case development.
- If rent or yield is not adjusted to high circularity and sustainability standard lower returns are expected.
- A rent premium is expected although this still accumulates uncertainty. Even though according to Hines research significant rent and sale premiums are expected with BREEAM Excellent and Outstanding certified assets. Currently this significant change only translate to the office market although this translation is anticipated to apply to the logistics sector as well. The sensitivity tables help see this change.

Note 1: Residual value calculation already exist although not yet applied in the market.
Note 2: Investing in ESG: Emerging Evidence on Cost and Value (Hines, Feb 2023)
Note 3: https://www.ramboll.com/insights/resource-management-and-circular-economy/the-circular-economy-taxonomy

F

Transcript presentation investment fund

Speaker 1
Can umm for Speaker 2 and Speaker 3.

Speaker 1
You know who?

Speaker 1
Uh, you're speaking with.

Speaker 2
Yeah, I'm happy to take the lead on that. You think great to meet you. Thanks again for the opportunity to hear this. So I'm Speaker 2 and I've been applying for about 6 years. I originally started in Houston, TX, kind of where PERE invesor Global headquarters is and I initially started on the asset management and acquisitions team for. PERE invesor Global REIT, which is the predecessor vehicle. So the current vehicle that we invest upon, which is hiding global income trust and so INVESTMENT FUND makes investments all over the world. I think at the latest we're about 70% US, 30% international. And so I had been focusing on acquisitions, but I've made the move over to London to focus on the PM side for the next two years. Umm Speaker 3is sitting here as well and he works with me directly. So Andre, maybe you can herself a little introduction.

Speaker 3
Sure. Thank you, Speaker 2. I'm speaker 3. It's my fourth-year routines. I started in late 2019 in the asset management team in Moscow. I was working with a portfolio of office and logistics properties and last year relocated to London and joined the portfolio management team where I'm currently an associate working with Speaker 2 on overseeing the European portfolio of INVESTMENT FUND, which is about 15 assets in seven different countries, including two fresh food parks in the Netherlands.

Speaker 4
Yeah. OK. Thanks. Umm so I will share my presentation and I will start explaining the proposal.

All right. So I will first explain what circular real estate development is. So circular real estate stems from the circular economy, which contrasts with the current linear linear economy of take, make dispose, and the circular economy is more of a cynical flow model that conceptualizes a loop economy to prevent waste for real estate, this means developing, using and reusing buildings without unnecessarily unnecessary depleting natural resources, polluting the living environment.
And damaging ecosystems.
And based on my research identified some circular real estate design STRATEGIES.
I made a four part division, so I have a review strategy, reuse strategy, reusable and renewable, and the hipbelt he posted this of my research is that the cost of such a circular so same as it is not more profitable investment than a normal traditional development.

And my case study therefore focuses on how to create a feasible business case. Despite this.
Yeah, higher cost basis and the research question of my my thesis is therefore you know what condition is there a feasible business case for real estate investors to make a positive investment

decision on circular real estate?
So the asset location from the development proposal is located on a agro food production park.

It's the essence quality of the current building is below current market standards and it it is therefore due for development.
This proposal is a distinct proposal previously suggested in June 2023.
But this proposal does uses the repositioning of the road adjacent to the plot that was proposed between 385152 and A3880, which I will further explain in the presentation.
So some property, some key facts, there's an opportunity to develop a new circle or 19,000 square meter gross building error area and conditioned circular logistic warehouse following the demolition and the reuse of the existing assets on plot 3851 and 5/2 the length is already in irons ownership via leasehold and really redevelopment of the asset was already accounted for in the new W and of the Gro food production park acquisition.
And we're assuming a blended efficiency of 95% and this will result in 18,000 square meters lettable floor area at the 61% coverage ratio.
I will now go further into the circular logistic development opportunity.
So the circular development outline is that follows, where we're using the demolition of the existing logistics warehouse to develop a new circular logistic warehouse where E reusing the existing materials of the old warehouse for the new development and otherwise the materials are recycled and existing foundation is in good condition and we're trying to reuse that for the new development.
The origin of the other materials that are used are as much non toxic, non toxic and of renewable energy such as biobased materials such as timber.
Furthermore, we're striving for only using geopolymer concrete or otherwise recycled concrete for lower CO2 production.
We're also making use of the existing energy grid and applying solar installation in the building.
So do these uh circular development outlines?
Uh, we're expecting a BREEAM excellent certification, but also a building passport and that's now something we're seeing in an alliance that building passwords are, yeah, especially in the residential sector that we're seeing a lot of building passwords, which has a material circularity indicator and an environmental performance of buildings index and a demountable aspect index, some other sustainable aspects.
We're expecting a significant CO2 reduction to the use of non toxic and biobased materials and here on the right are some example figures of another logistic distribution center that is developed now.
A circular distribution center that's now being developed in the Netherlands.
So some of the detailed specifications.
The development further makes use of all four circular design strategies, so the two figures here on the right are is how the current so it looks and how does circular redevelopment would look like, which also shows how to repositioning of the road is used to increase the plot 3880, but also where the reuse foundation is going to be reused.
Some of the key specifications that are used are the timber structure, a timber structure GOP on our concrete biobased isolation.
We also using new life boot composite facade and the finishing is this much reused and recycled materials such as reused doors, floor tiles and ceiling tiles for the layout.
We're using a standardized grid sizes and height to use for maximized adaptability.
Umm, so we made, we identified the base case for traditional development.
So this is not the circular developments and this is based on the proposed a development in June 2023 where we're seeing these assumptions and returns for traditional development.
And we also made a base case for circular development where we're not where we have not adjusted

the estimated rent value.
But we did.
Yeah, we're expecting a price increase of 15% in relation to the traditional development in hard cost and we're expecting this due to the increase in labor due to the technical aspects with the application of circular construction.
And we're also expecting this because of the increased material prices due to high end sustainability materials.
And we're seeing here that there's, uh, there's a lower profit associated with this circular development.
To account for this lower profit, we made the return sensitivity on the circular development where we looked into what what happened if we adjust the rent value or the exit yield.
So we made the sensitivity analysis on the IR and the trended development yield where we see that if the ERV is expected with an 8% increase, we're seeing already seeing that the work turns will get closer to the traditional development.
So we when we look at the comparisons comparison of the base case and the circular development, uh, we're seeing that there's a lower profit associated with the circular development, although the circular development does have a higher BREEAM certification of excellence a way lower CO2 production due to the circular development specs.
And what we're expecting is to rent and seals seal pre seal premium associated with the circular development which was not accounted for in this base case.
Uh, uh calculation.
So based on the estimated rent value made this the narrative scenario analysis.
So we made the scenario one where we increase the ERV with 8% and we made the scenario 2 where we increase the ERV with 10% and we compared it to compare this to the base case traditional development and we're seeing that especially with the 10% increase that we're getting closer to the same returns as the traditional development and we're expecting this increase that's mainly because the tenant is eventually going to pay more due to its own sustainable financial burdens such as CO2 texts and ESG investing.
There's also the investor appetite of the tenants.
So they did desire higher sustainability goal of their of the tenants.
Uh.
But we're also seeing significance.
Your view increases in the offer sector for BREEAM excellent and outstanding buildings certifications and we're we see that this will eventually translate through just a sector.
And there's also another aspect that's more on the social social responsibility of the tenant for to really rent a sustainable building.
Uh.
When we made the scenario analysis on the on the exit yield, we decrease the yield by 0.10% and 0.2% and we're seeing that we're not really getting close to the the same returns As for the traditional development, although we we're seeing an increase and this is also something where expecting.
So we also looked into some other potential solutions to investigate.
So based on the discussion we held here with the development team where some other potential solution he merged such as and a trend that we're now seeing in analysis that is that another a lot of Dutch funds are combining sustainable investments with some very high returning assets.
So this means that on the portfolio level, they still get the same returns for their investors, although they're also do have a lot of high sustainability investments in their portfolio.
And there's also growing interest among the investors to invest in highly sustainable circular investments and we are now expecting that they will maybe that there's at some point a shifts that are expect accept lower returns for enhanced sustainability aspects.
And currently in the business case is not yet that feasible because of the increase in in hard costs.

But we're expecting that due to the market and to the scarcity of materials and regulations of reuse materials, we think that the market prices for circular materials will eventually decrease, making the business case more feasible.
So the conclusion on circular developments, we're seeing the opportunity to develop a circular buildings now that reduce the CO2 production of the building significantly.
And based on my research, I'm also expecting a rent and sale premium associated with circular construction which were now already seeing a significant rent previews associated with, for example, UK certified BREEAM excellent office buildings, which is around 20% rent premium.
We assume that this market development will also translate eventually to the logistics sector also due to legacy legislation of the government towards tenants and social responsibility of the tenants.
Further financial benefits are subsidies, residual values of use materials, and there's even maybe a direct reductio in operating cost due to high the high sustainability materials and demountable construction.
So the benefits of a circular building.
Uh, yeah.
Further benefits, waste reduction, energy savings, flexibility and modularity.
Environmental awareness, rent and sales premium and yeah, they're the circular buildings are more in line with the new legislation on for example the U text and allow me and the EU Green Deal.
Uh, the cost at the moment, they're still a higher hard costs associated with circular construction return now anticipating at 515%. And the rent and yield is at the moment not really adjusted to the high circularity and sustainability standards there were expecting that this is in the future going to change and we're expecting that eventually rent premium is expected, although this is at the moment still accumulates some uncertainty.
And the check it for the presentation at the moment. So I would like if you you guys actually maybe have some questions about the proposal.

Speaker 2
E yeah, thanks so much for the presentation. I thought it was very informative. Clearly you've done done a lot of homework on this and very much appreciate you sending over.

I guess my initial question kind of you know in, in, in the current market environment where it's been kind of difficult to hit return targets and with especially with the rising interest rate environment where we expect higher rates for longer, who's currently doing this today, I guess who are the biggest players and who are their current investors?

I'm just wondering how they're making their numbers pencil because I do agree. Like when you show returns based on a tear down and replace versus these detailed circular specs.

Umm, you have to sell these higher development costs like you said, part of it is based on like you said, in the future getting a lower rental yield or a or sorry, a higher rental or a higher rent or a lower yield on exit. So how are the current people who were doing this making this work? Do you think?

Speaker 4
Well, currently in the logistics sector, we're not seeing that much circular distribution centers.

Although, the example shown in the beginning of the slide are now building a very big of 40,000 square meter circular logistic building. Although in the residential sector and the office sector are now seeing a lot more circular buildings, although yeah, so just mentioned like with BEEAM, especially in

the office sector, there's a lot more rent premium associated with. A very sustainable building and we're not yet seeing the same numbers for the circular developments, for the logistics circular developments.

Speaker 2
Yeah, I I agree that that was one of my concerns as well. That would be if you're starting to price out some tenants you know based on the rents, it feels like some of these guys are pretty cost conscious and you know having the charge of you're really kind of limiting yourself in certain ways, but understood that that makes sense that there would be more room at the the resi and office level.

Speaker 4
Yep. Umm.
And for example, like the other potential solution I mentioned with the like combining the two sustainable investment and a high returning investment. So that's the total portfolio, maybe even, yeah, returns at the at the same level. is that something where you guys at the moment are currently looking into?

Speaker 2
So it's probably a bit difficult for us. So INVESTMENT FUNDis an income fund and we're not typically set up for something like this. I feel like within our current investments with the with, with the Dutch team.

UM, it's a bit of a unique situation where there's a large amount of the park that's already income producing.

So at various times and as we're looking to upgrade the park, they do have, you know, significant interest in, you know possibly upgrading these as tenants leave or as things become you know, not viable anymore.

That being said, INVESTMENT FUND, being an income fund, if if you were to show kind of returns based on the teardown based on the circular and you were showing a level of the current delta, I think between them I think at this time it's difficult for us to go to umm you know our board and say hey, we're really we're we're willing to take a significant haircut in this for things that may or may not play out in the future.

I'm I'm definitely in agreement with you that this is this is down the road. I think it's a bit early for our cost of capital and I think there are funds out there that this would be very interesting for for INVESTMENT FUND specifically I think this is this, this, this might be a bit tough for us to to swallow at the time, but I wanted to ask you, I guess the for for those that are doing this, that, that for the research that you've seen or is there is there evidence starting to come to light of either getting higher rents for this product type or you know the benefit of the yield after it's completed?

Speaker 4
Well, most of the research and literature about rent premiums is still about the office. Yeah, the office sector and the residential sector.
And I think the logistics sector is just a way different than those sectors and that for it's very difficult to. But yeah, we're expecting that eventually, especially the higher earning companies that at some points are going to pay higher rents for a very sustainable logistic hall.

Speaker 2
And in in in terms of diligence, whenever your diligence and kind of the hard costs and the soft cost, we've had a number of, yeah, I say we're we're not we're not Development Fund by any means but we have done a bit and every time we get in there on something we've done for a refurb, we've done it by force on a student housing asset. We've done it in a previous vehicle that I've worked on in an office asset.

Haven't done it in logistics, but and I know it's it's it's a bit less involved just given this a warehouse, but once you once you get in there on certain uh specs, sometimes there are I'd say more to meets the eye than you initially anticipated and I realize you've got a contingency in there about 3% on hard costs and 2% otherwise. But do you think that it might make sense to underwrite a larger contingency considering this hasn't really been done before?

Speaker 4
Umm, yeah, maybe that's also in the sensitivity tables that I put a higher cost associated and then we're seeing that. Yeah, it's very difficult to achieve the same returns as with a normal traditional development.

And that's also something that we're expecting to change that because that at the moment there's there's enough steel to buy, there's enough concrete still to buy, but at some point that's gonna go get less and less. And especially in the netherlands where there's a lot of now rules and regulations about reusing materials, even the government's already starting to have has plans in place from 2030. I think I don't know if it's for the building sector, but it's definitely for civil engineering to own. 55% has to be circular. So I do believe the costs are gonna go down at the moment, but at this moment, yeah, it's it's a way. Yeah, it's a big price increase in compared to traditional building.

Speaker 2
Umm. And would be able to use. That's typical contractors that we would that you know that we would typically use or they're specialized, you know, GCS and and Subs that you would be required to use for something like this.

Speaker 4
Umm, I haven't really looked into the contractor, so maybe Speaker 5, or Speaker 5some.

Speaker 5
Spoke and answered, and the answer specialized.

You need a specialized contractor who has availability of the correct building materials with the correct certifications with obliged to all the building code regulations. Yes, the fun thing is stijn has spoken to one of those general contractors. Who has that ability?

Speaker 2
Do they have kind of? Fixed price contracts, or the typically or or the specialized contractors during that they might not be as large and not have the liquidity that others might have you know. Are you more open to cost overruns there or?

Speaker 5
This specific contractor has connected to a larger contractor firm, so it's a separate entity, although it's covered by the larger mother firm and therefore, I think they're way easily able to give a fixed contract fee. And so, I'm. I have no concerns about that part.

Speaker 2
OK. Gotcha.

Speaker 5
And what The funny thing is, is that there's just, of course, is on the forefront of what we are doing. Uh, I within our business, but we already see him building codes and local legislation and municipalities itself and even in the nitrogen discussion, reusing them in your materials becomes more and more a topic, not overly if it if it, if it is like to believe or philosophy, but it's more in making the numbers in terms of your building work.

You need to prove that you are less contaminating and less contaminating. Is far easier if you're reusing your materials because you're not dragging materials from one part of the country to the other part.
At least that's kind of what the numbers say, yeah.

Speaker 2
Right, right. They're they're so. And are there any subsidies available for something like this from uh from the Dutch Government?

Is something that would that would make you know, returns potentially more attractive from both an income tax perspective and also just on a cost recovery perspective.

Speaker 5
100%.

But the reason why there are not fully mentioned in this presentation is they vary from time to time, because at a certain moment the central government makes the makes a a certain amount.
For these kinds of topics, and when the the money is done, you're unable to apply for that specific subsidy, so it varies from time to time.

It varies from year to year and it's there and it can be a very large subsidy, but it's also it's very tailor made to the project, very tailor made to what you can answer to in terms of the questions and the requirements. It's very fluid in that perspective.

Speaker 2
And on the financing, I guess taking away that this is within a larger park in larger facility that we're currently going through refile on setting that aside on on these types of circular developments, would you expect a premium on the margin because of that? And if so, would it be significant?

I feel like in the past, green loans and things of that nature have been something fairly small, like 5 basis points on the margin. Is that something you would expect, or would you expect something a bit more given that this is kind of on the cutting edge?

Speaker 5
I would keep it just in line with the rest of the park, although I think there is an opening, but it's it's again you need to have a little bit more of a design, a little bit more of the the story to tell about the actual building itself before you can enter that conversation with your with your bank. I would just keep it for this thesis. The same with the rest of the park.

Speaker 2
OK. Speaker 3 and I'm not sure if you have any questions.
This is this is really helpful. Thanks for for some for answering.

Speaker 3
Yeah, maybe just a few quick ones.
Uh, do you mind going back to the underwriting slide for the base case?

Speaker 4
This one or the circular one? Ohh.

Speaker 3
Umm yes, uh, this so starting from this one. So I was wondering, how did you arrive at the hard costs figure Pascal meter of 792? Is it based on some resident projects or actual developments completed?

Speaker 4
This is actually the proposal. The proposal I use from the previous submitted proposal in June 2023 so.

Speaker 6
Andrey, This was a the one we discussed before the summer holidays. So there was a there was a hard cost number we used for the unconditioned redevelopment.

Speaker 3
And I presume the other line items in the budget are also taken from that case, such as soft costs indexation etcetera.

You are projecting 100% pre-let development but have no TI in the budget. Do you think some of them could be considered?

Speaker 4
Umm yeah, for this I made it the middle a little bit easier for myself to use a pre-lett of 100% so.

Speaker 3
In the event of the hard costs, for example, going through a massive cost overrun, the returns get diluted. How can you mitigate this risk with this development?

Speaker 5
You know, I hope you a little bit.

You're not gonna start the execution before you've got a written contract that covers the execution risk with the GC. That's the only solution.

Speaker 3
And when I also meant is uh is it possible to consider for example a yield and cost deal here so that the rents are essentially tied to the actual CapEx spend?
Also speaking about the rents, this 74.98 figure is it also based on the previous underwriting for this space or is it something? More up to date or based on some leasing comps.

Speaker 7
So imagine, where we're talking about a build to suit.
Or 100% pre let which to me are largely speaking the same thing that the yield on cost proposal is a good one only in the sense that the other thing that you would be using the TI's for is to accommodate after a spec. Uh, let's say predevelopment phase where you're doing a basic build. You're then accommodating the above standard tenant improvements the ST rents. So in this case, you wouldn't have to do that.

It's like it's a good question and a convenient example that Stijn is used, that we have a build to suit.

Outside of that, I don't see how it would work because you would need to have the the tenant on the forehand of the construction contract, which may also contribute to them agreeing to a higher cost cost profile, which might be what you actually getting at for circular development in a in a win win case.

And then we could, we could each eat from the same circular sandwich, so to speak, and then make a win win situation with a slightly different return profile.

Speaker 3
Umm, what are the measurements of the proposed development based on like, what determines how much office space there is and how much the mezz space there is?

Speaker 4
Well, for the to compare the basic traditional development to the circular development, I used the same numbers as proposed in the traditional development.

Speaker 3
Have you done any analysis on how much of the return is attributed to the exit value and how much is attributed to the cache flows that you received during the whole period? You are projecting a 10 year hold and I presume a large chunk of the returns shown here are due to the fact that you hold for 10 years.

But if you were to exit, for example in year five and subject to the exit yield being close to the level they show here, uh, have you run any analysis to estimate what the impact would be like how much of, for example, the equity multiple you're getting just because you're exiting at 5 and not due to the dividends that you've collected on the way?

Speaker 4
Uh, well, I just assumed that 10-year hold. So we haven't actually looked into a a hold period for shorter time, but that's definitely something we can still look into.

Speaker 3
Umm, maybe one other question is on financing again. So you fixed an average interest rate of 6,50, which I presume is an all in rate for the development and why do you think some funds would prefer to finance the development out of equity and then refinance? It won't completion or stabilization and some other funds would prefer drawing that together with equity as they go along and construction.

Speaker 4
Speaker 1 you actually worked on the the the loan part game maybe help a little bit more?

Speaker 1
Yes, I can. I think the the goal of the presentation wasn't to go into every single underwriting detail, but rather just take a base case and see if we could create out of that base case of feasible business case by manipulating some values in the. In the base assumptions, one of the things that Stijn and I talked about was you could potentially get a lower interest rate loan because it's such a sustainable building.

But as we discussed before, it's not really a. It's likely not going to be so significant at this time, especially in the current market conditions, to assume a significantly less. Yeah, a lower interest cost.

And yeah, I think you could change your assumptions on, umm, percent of equity versus alone, but it wasn't something that we really considered when doing this original underwriting.

Speaker 2
Thanks.
I think what Speaker 3 is getting it was kind of just, you know based on the kind of capital that would be targeted for this like INVESTMENT FUND specifically being income warranted versus capital appreciation, you know certain certain preferences or likely to be made.
And so that's helpful context.

Well, I don't have any further questions. This is this is a great presentation. Thanks again for for going through it.

I think you put a lot of thought into it and it's definitely interesting to hear, you know, kind of what's on the forefront of of, you know, sustainability.

I think INVESTMENT FUNDis definitely interested in making sustainability priorities, so I think that, you know, seeing these kinds of things are very interesting for us and kind of going forward.

So appreciate it.

Speaker 4
Umm Yep.

Speaker 7
I have a question.

Speaker 4
Yeah, sure.

Speaker 7
I don't know if I'm allowed, but I guess so.

Speaker 4
Go ahead.

Speaker 7
And the the materials required for circular construction.

Uh, obviously, come from lots of places, but among them buildings that exist that are going to be demolished and there's a interest that I've developed in what I didn't know was a thing called urban Mining.

From a conversation I had with what Speaker 5 and where they're going with this is, is there an income opportunity with so many buildings that are scheduled for demolishment or redevelopment?

Uh, on behalf of INVESTMENT FUND and either of the parks where we take the materials and carefully deconstruct them, and even if it's in the single digit, you know, hundreds of thousands, it may well be worth the.

Let me say marketing effort towards external clients, including the shareholders of the fund or unit holders of the fund.

I don't know if you looked into that at all,

Speaker 4

Well, I'm the research I found was that a lot of like and demolition contractors earn a lot of money. Like, yeah, in in demolition inning building. So I think definitely if you and that's also really a circular strategy to make the the building demountable. So not fixed.Yeah.

Connections but loose connections, so the whole building is demountable and some yeah things can be reused and especially in the logistics sector where a grid sizes are fairly standard and through whole of Europe. So steel beams and everything are can be reused in a lot of other buildings.
So yeah, it's not something I looked into, but it's definitely a strategy if in the circular economy.

Speaker 2
I think it's interesting, speaker 7, especially if you know if you are gonna go on the route of umm, you know, demolishing it and and and building from from the ground up, you know what?

What would you do with those materials and if there is a route like that, that'd be interesting to hear.

Speaker 7
Thanks it.
It feels to me like there's a in internal circular opportunity for PERE investor

Generally, with your portfolio assets, now I have no idea if you can reuse concrete from a pad of 1 building and in the next one, but it feels like you could and then Martine seems to want to contribute to that.

Speaker 5
Yes you can, yes.

Speaker 7
But even simple thing, even simple things like the aluminum siding, you know, reimagining that or upcycling that for use in a residential project or or lots of different examples we could all creatively think of you, you, you, we we tend to discount the cost of the stones and it sounds like what starting to saying also is that you would end up having a higher demolition cost because they don't recover the value of the scrap assets but. Something to look into.

Speaker 3
Yeah, yeah.

Speaker 2
Yeah, yeah, I know.

Worth worth doing it side by side for sure and just kind of making a call because like you said, if it's depending on on, on how material that is to the contractor or to you know on on demolition could be interesting so.

Speaker 4
All right.

I don't particularly have anymore questions.

I don't know if anyone else still have a has a question or some some points of attention.

Speaker 7
Sorry, I have another question and I don't know if it's for you or for or anyone else. We obviously have a bit of a building industry crisis. These would be nitrogen and getting the appropriate credits to proceed. Does this method of construction help at all?

It is that itself a reason. Maybe it was covered while I wasn't on the phone.

Speaker 6
Yeah, it was a pointed out by Speaker 5

Speaker 6
I think in a way, yes, it it helps definitely to get your calculation right because you need less or more traffic towards your construction site well so.

So let's emissions during now during the construction.

Speaker 5
simple, less, contaminated

So it's indeed the answer.

Speaker 7
Thanks.

Speaker 4
All right.I think uh, at least uh, thank you for your participation.

I, uh uh.Now start finishing up my thesis and thank you for yeah, helping me get to probably my results.

Speaker 2
Appreciate it.

Speaker 4
So, especially in , thank you very much and yeah.

Speaker 2
Thank you.

Speaker 3
OK.

Speaker 2
Appreciate it.

Speaker 3
Thank you.

Speaker 3
Thank you,

Speaker 7
I like watching you work,.

You're very calm on the fire. You could you could join my army anytime.

Speaker 4
Thank you.

Speaker 2
Have a good rest of the day. Thanks.

Speaker 4
Yes, why?

Speaker 3
Thank you.

All right.