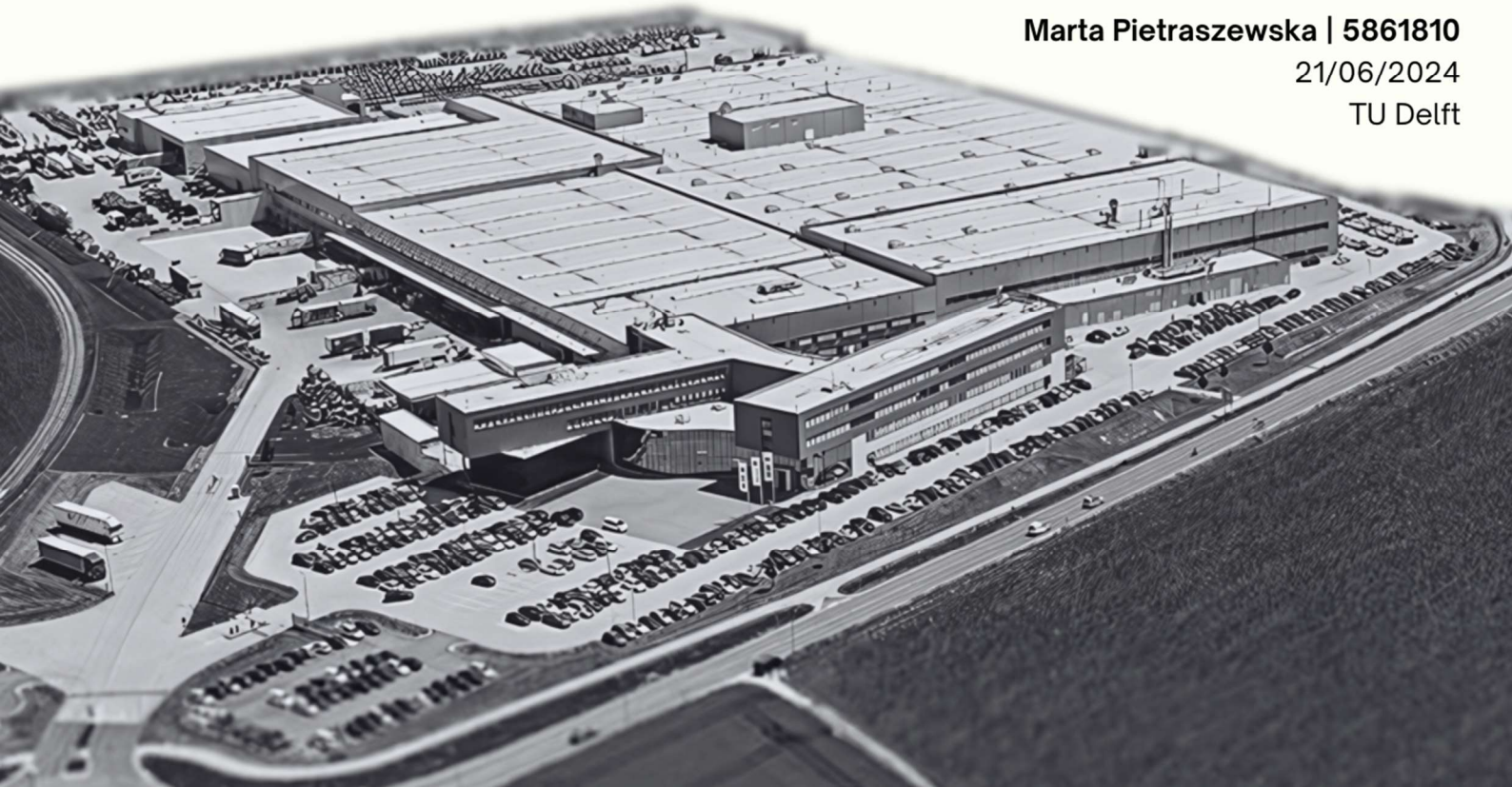
# Drivers of sustainability in industrial real estate

Case study on corporate real estate of a manufacturing company



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## Abstract

The significance of sustainability and sustainable development has been the subject of increasing attention. As is evident in our daily lives, sustainability concerns individuals, but it is also on the agenda of governments and private organisations. Many sectors have focused on sustainability, including corporate real estate, but in this sector the focus is mainly on offices. There is a lack of literature on industrial real estate, which plays the supporting role to the main business, in the context of sustainability. This research aims to address this specific type of corporate real estate and to explore, through a case study, what drives sustainable development in the corporate real estate of a manufacturing company located within the European Union. The case study method included literature review, interviews and document analysis to answer the main research question: "What are the external and internal drivers of sustainability in corporate real estate management of a manufacturing company?" Based on literature and market findings the research was designed around four main categories of drivers: stakeholders, financial incentives, regulatory drivers and risk management. The findings show the importance of stakeholders and regulations; financial incentives are important but not directly recognised as drivers; climate change risk and risk management are at an early stage of development. Nevertheless, there is a growing recognition of the importance of sustainability of corporate real estate, despite its supporting role. This research contributes to the knowledge gap regarding the sustainability of industrial real estate.

**Keywords**: industrial corporate real estate, corporate real estate management, sustainability, drivers

## Summary

### Introduction

Climate change is no longer perceived as a solitary whim of environmentalists. Studies show that the rate of climate change is actually much faster than we expect (Hausfather, 2023). The rate and consequences of climate change are analysed by the Intergovernmental Panel on Climate Change and their reports are the trusted source of scientific evidence for climate negotiations. Real estate plays an important role in the climate change and actions related to buildings play a vital role in the environmental discussion. According to the latest report by IPCC (2022) buildings account for 21% of global GHG emissions (data based on emissions in 2019) which is 2% higher than stated in the fifth IPCC report published in 2014. The built environment is closely related to the energy market as the buildings use a substantial amount of energy and electricity. In 2019 residential buildings consumed 70% of global electricity demand and the global electricity demand is constantly growing (IPCC, 2022). One major group of real estate assets belongs to manufacturing industry. In Finland amount of industrial facilities is almost six times larger than that of office premises (Ristaniemi & Lindholm, 2011).

### Problem statement

Together with the rapid global growth and rapid climate change the concept of sustainability has become an important topic, also within real estate, which contributes significantly to the global energy consumption. Research has been focusing on sustainability within real estate but mostly with emphasis on residential and offices. There is little mention of industrial real estate in the discussion, especially in regard to real estate owned by the companies, whose main business focus is other than real estate. Research on the sustainability of businesses tends to concentrate on the primary actions and products, with less attention being paid to the supporting parts of the business. Therefore, this research aims to analyse the drivers to sustainable change within industrial real estate of a manufacturing company. The research will focus on internal and external drivers taking into account the context in which the company is set.

### Theoretical background and framework

The theoretical background focuses separately on corporate real estate and sustainability. CRE is defined as the real estate necessary to conduct business – the bricks and mortar of office buildings, manufacturing plants, distribution centres, retail stores and similar facilities CoreNet Global (2015). Even though CRE plays a strategic role in many organizations it rarely captures the attention of senior management. It often plays a second-order function (Apgar, 2009). Industrial real estate is a specific type which includes manufacturing facilities, warehouses or logistics centres. Usually these buildings are located outside of urban areas and the companies prefer to be the owners

of those premises. The main focus is put on functionality of the building which is based on the production process. Even though industrial real estate makes up a large proportion of global real estate it is often omitted in literature. This is visible in literature on supply chain, on sustainability in real estate or in the European Sustainability Reporting Directive.

Sustainability is a popular and important concept which can be defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). It is often associated with maintaining balanced growth, for example, as Elkington (1998) suggests, by maintaining a balance between the economic, environmental and socio-cultural dimensions. There is a global transition towards sustainability, which has become the subject of research. Sustainable transition is a uniquely complicated process especially in the hegemonic world of neoliberal capitalism. The introduction of complex sustainable transitions at the corporate level can give rise to conflicts. The experience of tensions and conflicts in corporate sustainability is a daily occurrence, "they cannot avoid them if they want to be truly sustainable" (Köhler et al., 2019). Literature on paradox in sustainability also emphasizes the importance of policies and role of policy makers in encouraging the change. Despite the challenges sustainable transition is a top management's agenda item for most organisations. Since sustainability is a current and vivid topic, new concepts emerge such as double materiality. Organisations focus mostly on how they affect the world but more attention should also be put on how the changing world affects the organisations and furthermore those risks should be assessed and addressed.

**Research methods**

The research is answering the following research questions:

Main research question:

**What are the external and internal drivers of sustainability in corporate real estate management of a manufacturing company?**

It is followed by four sub questions:

1. Who are the most important stakeholders driving the sustainable change in corporate real estate management?
2. What are the financial reasons for sustainable implementation in industrial corporate real estate management?
3. What is the role of European and national regulations in sustainability implementation in industrial corporate real estate management?
4. Is double materiality taken into account in the aspect of climate change risk management?

The method chosen for this research is single case study conducted at Wacker Neuson SE. The research was made of three phases: preparatory, fieldwork and theorizing phase. Two sources of data were used in the research: semi-structured interviews with employees of Wacker Neuson and corporate documents of WN.

**Findings and discussion**

The research focused on four categories of internal and external drivers: stakeholders, financial incentives, regulatory drivers and risk management. It was found that the stakeholders are the most important drivers, with the emphasis put on internal stakeholders on the top management level. Interviewees pointed out different drivers depending on their function and position within the company. Financial incentives were not recognized directly but it became apparent that the prevalent economic language and importance of investment evaluation is in fact an important driver. Regulations were recognized as important drivers, especially if those are obligatory. Depending on function of the employee emphasis was put on various regulations. Double materiality not widely known among employees. The regulations impose actions on companies regarding risk management related to climate change but the topic is not given more attention. Throughout the interviews a couple of topics emerged such as importance of local communities, role of communication and transparency, energy security and time.

**Conclusion**

The conducted research found that within a manufacturing company most important internal drivers are stakeholders such as the CEO, executive board and the employees together with financial incentives such as investment cost and potential savings. The most important external drivers include regulations and external stakeholders such as competition and customers.

**Limitations and recommendations**

The main limitations of the research include the use of a single case study method, limited access to interviewees, limitations of the interview method, limited time to conduct the study and limited publications on the sustainability of industrial real estate. For further research it is recommended to conduct the research at multiple organisations within the same sector. Furthermore the research could go beyond the European context.

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## List of abbreviations

| | |
|---|---|
| CRE | Corporate real estate |
| CREM | Corporate real estate management |
| CSRD | Corporate Sustainability Reporting Directive |
| EC | European Commission |
| EFRAG | European Financial Reporting Advisory Group |
| IRE | Industrial real estate |
| TBL | Triple Bottom Line |
| WN | Wacker Neuson |

# 01

# Introduction

# 1 Introduction

## 1.1 Rate of climate change

Climate change is no longer perceived as a solitary whim of environmentalists. Studies show that the rate of climate change is actually much faster than we expect (Hausfather, 2023). The rate and consequences of climate change are analysed by the Intergovernmental Panel on Climate Change and their reports are the trusted source of scientific evidence for climate negotiations. Their latest report was published in 2023 and states that “human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850–1900 in 2011–2020. Global greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals” (IPCC, 2023). IPCC predicts that the projected long-term impacts of global warming are up to multiple times higher than currently observed. Even though discussion about climate change has been going on for years the industry's response seems inadequate. There is still a lot that can be done (Hausfather, 2023). The latest IPCC report emphasizes that although there is progress in adaptation planning and implementation there still exist an adaptation gap that will grow with the current rates of implementation. On the positive side policies and laws addressing mitigation have consistently expanded since the previous report published in 2014. Towards the end of the report the panel of experts emphasizes that the change is possible with suitable governance and policies, equity and inclusion and finance, technology and international cooperation.

## 1.2 Contribution of real estate in climate change

Real estate plays an important role in the climate change and actions related to buildings play a vital role in the environmental discussion. According to the latest report by IPCC (2022) buildings account for 21% of global GHG emissions (data based on emissions in 2019) which is 2% higher than stated in the fifth IPCC report published in 2014. The built environment is closely related to the energy market as the buildings use a substantial amount of energy and electricity. In 2019 residential buildings consumed 70% of global electricity demand and the global electricity demand is constantly growing (IPCC, 2022). Reports by IPCC or IEA draw attention to the built environment and its effect on the natural environment. In most publications the impact of real estate on the natural environment is depicted through CO2 emissions. The topic of real estate and its impact on climate change is complex due to multidimensionality of energy consumption. For example the emissions arising from manufacturing and processing of building materials which are called ‘embodied’ GHG emissions. If we take those into

account the emissions escalate from around 20% to around 40% (Röck et al., 2020). Long supply chains and various data collection methods hinder reaching global GHG reduction targets. Real estate should be monitored and seriously taken into account in discussions about climate change mitigation.

## 1.3 Proportion of industrial real estate

One major group of real estate assets belongs to manufacturing industry. Manufacturing enterprises contribute to environmental pollution and are usually held accountable through national and international policies (ECI Solutions, 01.03.2022). According to Ristaniemi and Lindholm (2011) industrial facilities constitute a significant proportion of the overall real estate assets in Western countries. However, the real estate research has focused on tertiary economic sector (services) and office use. There have been only a few studies focusing on corporate real estate management and sustainability in industrial facilities. In Finland the amount of industrial facilities is almost six times larger than that of office premises (Ristaniemi & Lindholm, 2011). Corporate real estate is a crucial part of running a business but usually it is a supporting part. Its role is to add value to the business and to align with the needs of the users. In the climate change discussion the impact of corporate real estate focuses on owners of real estate, mostly owners of office buildings. Consultancy firms also focus mostly on office buildings in their sustainability reports. More and more factories and warehouses built in recent years have begun to follow more conscious practices. Often companies are obliged by policies, but they also adopt the practices because it affects the public image of the company. Some companies already see the need to implement various initiatives to reduce environmental impact of their buildings (Logisticsinsider.in, 2023). The amount of industrial buildings in the world is significant and should not be omitted in the sustainability discussion.

## 1.4 Sustainability

Together with the rapid growth of economy and visible climate change the concept of sustainability has also been growing. Sustainability can be defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987). Sustainability is often linked only to environmental dimensions while the holistic approach would also involve the financial and social aspect, as proposed by Elkington (1998). In 2001 the European Commission (back then named Commission of the European Communities) published a “Green Paper” in which they discuss the importance of corporate sustainability, emphasising going beyond the environmental aspect (Commission of the European Communities, 2001). Increasingly more organisations put emphasis on sustainability as a pillar for their development. Some of this is imposed by oncoming regulations. Governments and non-government organisations have been recognizing the need to lever the sustainable growth. In his work Elkington (1998) already mentioned the need to systematize sustainability

reporting and audits. Since then various non-financial reporting initiatives have emerged, first starting with non-obligatory guidelines. The most recent non-financial reporting regulation (which will be obligatory from 2026 onwards for the largest organisations) is the European Corporate Sustainability Reporting Directive (CSRD).

## 1.5 Sustainability drivers

The importance of sustainable growth is indisputable but organisations have to have particular incentives to implement sustainable growth. It is difficult to list drivers to sustainability that would be universal for all organisations and situations. European Environment Agency has published a report on "Drivers of change of relevance for Europe's environment and sustainability" (Benini, 2020) which refer to all the actions within the European Union and can serve as an initial guideline. The EEA has recognized 6 clusters of drivers based on global and local trends. The drivers of change include population changes, environmental degradation, scarcity of global resources, technological change, economy and geopolitical changes and changing social and governance patterns. Those general drivers can serve as a starting point for developing sustainable strategies.

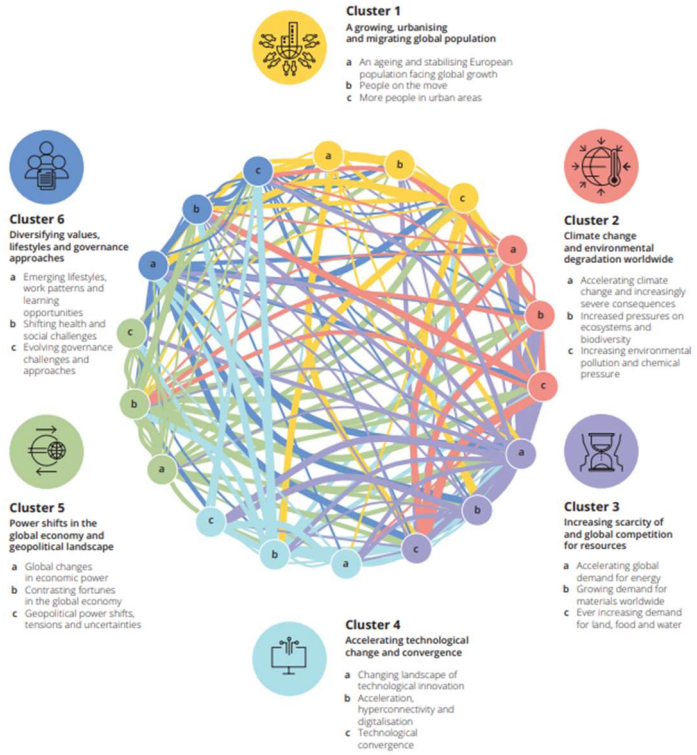


Figure 1. Thematic clusters and their interactions. Source: Benini, L. (2020). *Drivers of change of relevance for Europe's environment and sustainability*. EEA Report No 25/2019.

Sustainability reporting is becoming more common among organisations, even if it is voluntary reporting. It is driven among others by sustainable investors who consider financial as well as non-financial information in their decisions (Arnold et al., 2012). Literature on drivers for sustainable reporting for corporations distinguishes

maximisation of shareholder wealth, maintenance of organisational legitimacy and the management of risks to corporate reputation as the fundamental drivers of sustainability reporting (Adams and Whelan, 2009). Sustainability reporting is still evolving and is expected to continue to change over the coming years, and organisations will need to respond to these changes.

## 1.6 Problem statement

Together with the rapid global growth and rapid climate change the concept of sustainability has become an important topic, also within real estate which contributes significantly to the global energy consumption. Research has been focusing on sustainability within real estate but mostly with emphasis on residential and offices. There is little mention of industrial real estate in the discussion, especially in regard to real estate owned by the companies, whose main business focus is other than real estate. Research on the sustainability of businesses tends to concentrate on the primary actions and products, with less attention being paid to the supporting parts of the business.

| Well-researched topics | Less researched topics |
|---|---|
| Commercial real estate | Industrial real estate |
| Corporate sustainability | Sustainability in real estate |
| Corporate real estate management | Sustainable corporate real estate management |

Table 1. Research gap. Own work.

Therefore, this research aims to analyse the drivers to sustainable change within industrial real estate of a manufacturing company. The research will focus on internal and external drivers taking into account the context in which the company is set.

## 1.7 Research questions

Main research question:

**What are the external and internal drivers of sustainability in corporate real estate management of a manufacturing company?**

It is followed by four sub questions:

5. Who are the most important stakeholders driving the sustainable change in corporate real estate management?
6. What are the financial reasons for sustainable implementation in industrial corporate real estate management?
7. What is the role of European and national regulations in sustainability implementation in industrial corporate real estate management?
8. Is double materiality taken into account in the aspect of climate change risk management?

## 1.8 Case study organisation

To answer the research questions the case study method was chosen. The case study is a single case study within one organisation. The chosen organisation is Wacker Neuson SE, a German manufacturer of construction equipment and compact machines for concrete and construction site technology, listed on the stock market. Currently I am involved with the Dutch company of the Wacker Neuson Group and hired as junior project manager.

The company was founded in 1848 in Dresden by Johann Christian Wacker. Among the company's innovative developments were an electrical rammer and a high-frequency technology for internal vibrators. The company continued to expand as a group through merges with Weidemann GmbH in 2005 and through merger with Neuson AG to create Wacker Neuson AG in 2007. The Wacker Neuson Group employs currently around 6579 employees worldwide and generated an annual revenue of around EUR 2.655 billion (Wacker Neuson, n.d.).


Figure 2. Division of employees within the Wacker Neuson Group. Source: Wacker Neuson (2023).

### Wacker Neuson's real estate assets and management

The Wacker Neuson products start with manufacturing at one of their 8 production locations worldwide. Four of them are located within the EU: three in Germany and one in Austria. All of the production sites are company-owned. This is an important characteristic of most industrial real estate (Lindholm & Ristaniemi, 2011). It follows that manufacturing sites are vulnerable because they are built for a longer period of time, and are therefore less flexible due to their size and role. This type of property is more vulnerable to any type of environmental hazard. Once the products are ready to be sold they are transported to the subsidiaries. In Germany there are 71 subsidiaries, 68% of them are leased, the rest is owned. Another distribution line is through dealers who operate also in other countries such as Sweden or Italy. CREM is both functionally and geographically segmented, i.e. there are employees who are mainly responsible for production sites or subsidiaries located in Germany. The company has its own internal Corporate Real Estate department, which oversees various real estate investments in new and existing buildings. Operational functions are covered by facility managers. Each production site has its own facility manager. The role of real estate is also partly integrated into the overall strategy defined by the management team at the headquarters in Munich. The organisation is matrixed, with different levels and roles interacting with each other. The research will focus on the production sites because the CRE department I am working with is responsible for the production sites. Also, the company's overall portfolio is broad and would be difficult to analyse within the scope of this master's thesis. The employees interviewed and documents analysed will be related to the following four production sites in the EU:


Image 1. Locations of 4 production sites of Wacker Neuson. Own work.


Image 2. WN production site in Korbach, Germany. Source: wackerneuson.com (retrieved: 10.01.2024)

Construction date: 2004 and extensions: 2007, 2021, 2023

Gross floor area: 31 379 $m^2$

Korbach site is located in the state of Hesse. Telehandler and wheel loaders are produced there (Wacker Neuson, n.d.). According to the Wacker Neuson Non-Financial Report for 2023 the following sustainable solutions have been implemented at this location: photovoltaic system, electric preheating for paint shop to reduce natural gas consumption, waste compactors, modernised heating control system, installed rainwater cisterns (Wacker Neuson, 2024).


Image 3. WN production site in Hörsching, Austria. Photographs taken by author.

Construction date: 2012 and extensions: 2015, 2023

Gross floor area: 71 194 $m^2$

One of the production sites is located in Austria. It was built in 2012, expanded in 2015 and is home to production of excavators and dumpers (Wacker Neuson, n.d.) Measures implemented there include photovoltaic which is currently being expanded, reduction in waste through reusable containers or project for heat pumps (Wacker Neuson, 2024).

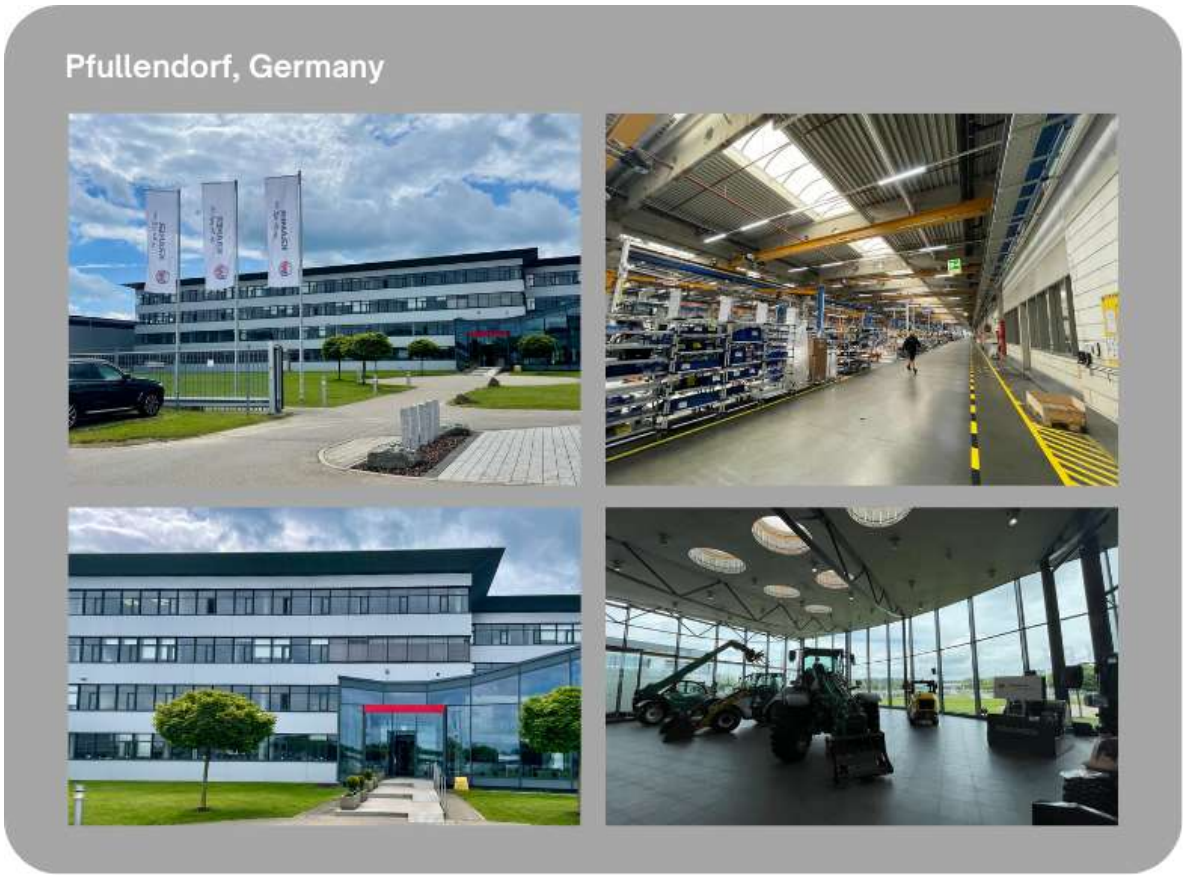


Image 4. WN production site in Pfullendorf, Germany. Photographs taken by author.

Construction date: 2008 and extensions: 2021

Gross floor area: 62 992 $m^2$

The third site is located in Baden-Württemberg and is home to Kramer brand that belongs to Wacker Neuson Group. The plant has been producing compact telehandlers and wheel loaders since 2008 (Wacker Neuson, n.d.). The sustainable measures include photovoltaic system, conversion to LED lighting, project of water heat pump for heating the office building (Wacker Neuson, 2024).


Image 5. WN production site in Reichertshofen, Germany. Source: wackerneuson.com (retrieved: 10.01.2024).

Construction date: 1960 and extensions: 1972, 1986, 2016, 2018

Gross floor area: 59 458 $m^2$

The oldest site is located in Bayern and is responsible for production of smaller equipment for soil e.g. vibrators, vibratory rammers as well as spare parts. The site was first opened in 1964 and is a 102 000 square meter facility (Wacker Neuson, n.d.) Besides production the location focuses on training for employees and local sales partners. Sustainable measures in Reichertshofen which are described in the Non-financial Report for 2023 include photovoltaic panels, renewed heating and cooling systems, LED exterior lighting, thermal refurbishment of halls 4 and 5 (Wacker Neuson, 2024).

**Wacker Neuson's approach to sustainability**

The choice of this company was induced by their focus on sustainability. The emphasis put on innovation and sustainability at WN is mostly visible through their products and the Zero Emission line of battery-powered machines (Wacker Neuson, n.d.). Beyond that they have established a strategy called Strategy 2030 which encompasses the identity and direction of growth of the company. One of the four main values is sustainability and one of the 9 strategic levers is sustainable actions. The sustainable growth focuses on being a responsible employer, attracting new talents and developing innovative products, respecting human rights and the environment (Wacker Neuson Group, 2024).

## 1.9 Scientific relevance

The following research is important for several reasons. First, it addresses one of the most pressing issues in the world today: sustainability in various dimensions. Secondly, as part of research proposal a literature review was done on real estate in industrial sector and sustainability in corporate real estate management. There has been little research on the sustainability of real estate as a business support function or on industrial real estate management. Therefore, this research can draw attention to the lack of research on these topics and add to the existing body of knowledge.

## 1.10 Societal relevance

As mentioned the research addresses the issue of sustainability. In this case it focuses on the two dimensions: environmental and social. This research draws attention to tackling the climate change through addressing a part of a large industry that is not spoken about a lot in the literature. Addressing risk management also draws attention to social sustainability and caring for proper working environment of people hired in the manufacturing industry through safeguarding proper building conditions. The objective of the research is to expand the understanding of sustainability beyond the environmental domain, with a particular focus on less prominent fields such as industrial real estate.

## 1.11 Sector relevance

The topic of sustainable real estate strategy among manufacturing companies has not been researched well enough up to this point. This research pinpoints the most important drivers of sustainable management for real estate. They can serve as incentives for other companies in this sector to implement sustainable management that goes beyond financial benefits and defining important aspects of sustainable real estate which will safeguard adequate working conditions regardless of climate changes.

# 02

# Theoretical background and framework

# 2 Theoretical background and framework

## 2.1 Corporate real estate

### 2.1.1 What is corporate real estate?

According to CoreNet Global (2015) corporate real estate is the real estate necessary to conduct business – the bricks and mortar of office buildings, manufacturing plants, distribution centres, retail stores and similar facilities. Nevertheless, it is important to note that there is a distinction between commercial and corporate real estate. While these two sectors are closely related, there are significant differences between them. "In the commercial real estate world, the business *is* the real estate. In corporate real estate the real estate *supports* the business function." (CoreNet Global, 2015) The supporting role of real estate in a business is described well in an article by Mahlon Apgar (2009) who explains: "Business real estate is [...] a strategic resource. But it rarely captures senior management's attention. In many organizations, real estate remains a reactive, second-order staff function [...]". A crucial characteristic of CRE is its alignment with the core business strategy and "partnering with the business and adding strategic value" (CoreNet Global, 2015). CRE shifted from being solely a cost to the role of value driver for an organization. The development of theory in CRE puts emphasis on the expanding roles of CRE and its leaders. More and more pressure is put on CRE departments which are to be more efficient and more effective. There are various factors affecting the shifting role of CRE departments such as: macroeconomic conditions, globalization, technology, demographics, corporate social responsibility or sustainability. The complexity of CRE is resembled mostly in its mutual interaction with multiple stakeholders. This thesis will focus on corporate real estate with the supporting function to the production and sales of construction equipment.

### 2.1.2 Industrial corporate real estate

A unique and at the same time very common example of corporate real estate is industrial real estate. Such facilities include manufacturing facilities, warehouses, logistics centres etc. Ambrose (1990) defines industrial real estate as "the land, structural improvements and equipment connected with a particular property that is being used for the conversion of materials into finished manufactured products". According to Ristaniemi ad Lindholm (2011) the first theories on management of real estate emerged from this sector and only later the focus shifted to offices and service related real estate. Industrial real estate is motivated by distinct incentives compared to other types of corporate real estate, including commercial real estate. It seems to be omitted in the literature, maybe because as Ristaniemi and Lindholm (2011) mention "the facilities are not seen as resource – they are only providing shelter for the production processes" and perhaps this attitude is not promoting advanced research in the field. Ristaniemi and Lindholm (2011) pinpoint other characteristics which are

important when analysing industrial real estate: location and ownership. Usually the buildings are located outside of urban areas and the companies prefer to be the owners of those premises. The main focus is put on functionality of the building, which is based on the production process. The main principle for development of this type of real estate is optimal performance. The fulfilment of human scale comes purely from the health and safety perspective (Schless et al., 2000). Looking at the overall costs of a company the costs related to real estate are relatively low (Roulac et al., 2005) and thus the attention might be proportionally smaller. At the very beginning of development of industrial real estate the buildings did not require special managerial attention. Usually the owner of the company was involved in all its activities, including real estate (Krumm et al., 1999). Then the industrial revolution and changes in accommodation needs led to construction of buildings especially for industrial processes. Consequently management of this type of real estate started to develop. In the last twenty years we could notice that research and focus has shifted to service sector (Ristaniemi&Lindholm, 2011).

There is still little literature on corporate real estate in the industrial sector in general, especially within the European context; much more emphasis is put on the topic in the United States. Often the literature focuses solely on industrial real estate as an investment opportunity (Polk, 2022). The literature that refers to or researches offices and services should not be extrapolated on industrial sector as “distinctive differences are apparent between the industrial and non-industrial sectors across number of [...] policies, functions and activities” (Roulac et al., 2005).

### 2.1.3 Corporate real estate management

In a 2001 paper by Manning and Roulac an alternative model for corporate real estate management was developed, based on emerging direction of corporate real estate management research discussed since 1990 in literature. The literature observed that CREM “embraces external and internal dimensions” (Manning&Roulac, 2001). The external dimensions include customers, competitors and real estate concerns, whereas the internal ones include business operations, human resources, information technology and company’s real estate support services. The authors noticed a shift from focus on internal orientation towards more external, also addressing the concerns of senior management. Over the decades “responsibilities have continued to broaden and become more complex in order to keep up with changing environmental conditions, increased rates of change and increased globalization as well as increased CREM knowledge” (Manning&Roulac, 2001). The CREM literature at that time was already pointing out the environmental concerns and the rapid rate of change which is an important aspect of sustainability transition today. The authors finally address the topic of finances stating that “a broader perspective that includes not only the traditional financial focus, but also an explicit business, as well as real estate, focus, with both

external and internal dimensions as part of an integrated corporate real property management paradigm". Their alternative CREM model is presented below:

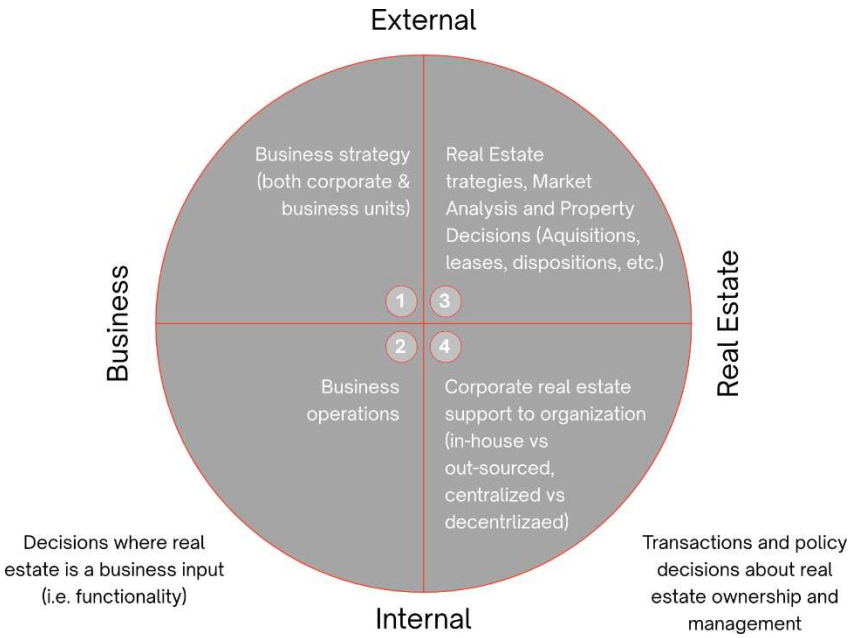


Figure 3. Alternative corporate real estate management framework by Manning & Roulac (2001). Own work based on Business Real Estate Decisions in a Strategic Management Context by Manning & Roulac (2001).

The first quadrant focuses on business strategy including market strategy and political and legal requirements; second quadrant includes corporate and individual business unit manager levels; third quadrant includes property procurement and management and maintenance of an overall real estate strategy; the last quadrant refers to providing real estate services at all levels. The graph emphasizes the different dimensions of corporate real estate. All of the dimensions are relevant for a successful corporate real estate aligning with the main business, which is embedded in the current rapidly changing economy.

### 2.1.4 Added value of corporate real estate

Another important topic in understanding corporate real estate is the role of added value of CRE. One of the first papers on value creation was by Nourse and Roulac (1993) where the authors emphasize that an effective real estate strategy has to be linked to the corporate business strategy. Ristaniemi and Lindholm also emphasize the link between CRE and shareholders' wealth by saying that "the ultimate objective of CREM's added value is to maximize the wealth of shareholders which can be achieved through revenue growth and/or profitability growth". Different driving forces contribute to the real estate strategy. Ristaniemi and Lindholm's research gives insight into which added values are important in IRE in comparison to office and service oriented real estate. They pinpoint that "due to large difference in industrial premises and offices the previous added value models of corporate real estate management created mainly for offices are not applicable to industrial premises".

Their results are shown below where among one of the three added values on corporate level is embracing sustainability.

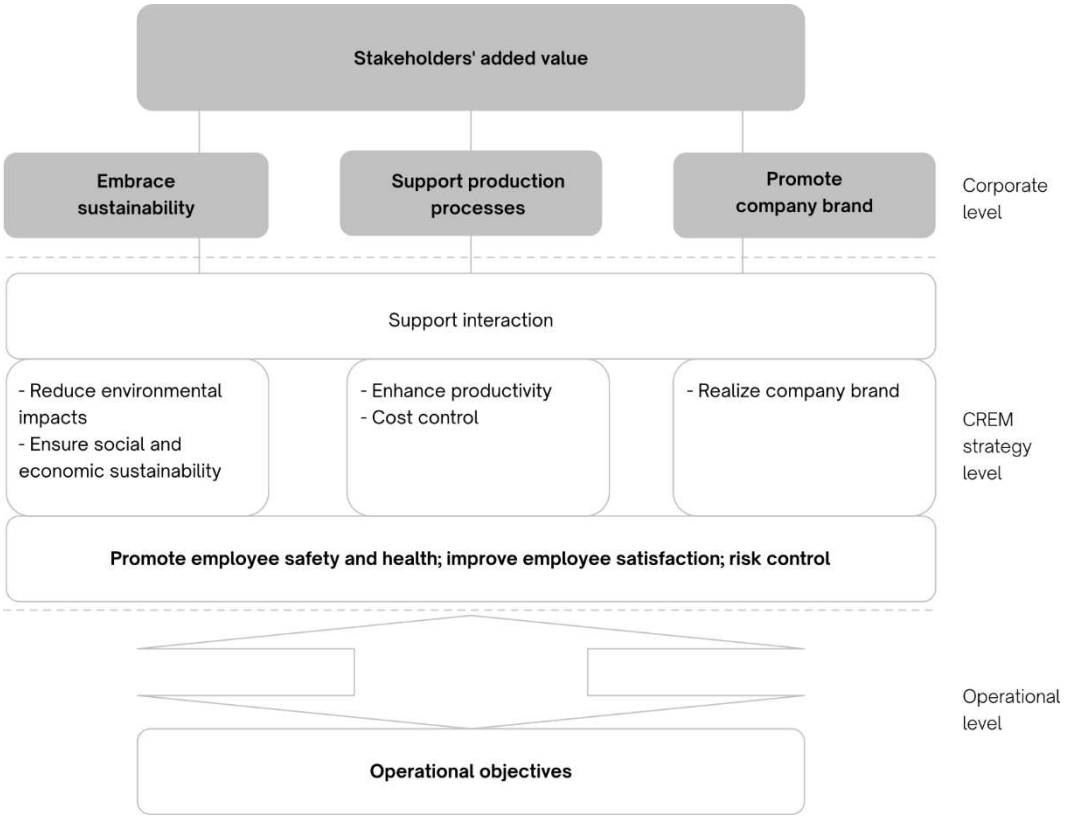


Figure 4. Added value model for industrial premises. Own work based on Ristaniemi and Lindholm (2011).

### 2.1.5 Industrial real estate in the 'grey area'

There is little research on the manufacturing sector and its real estate, especially in the case where the manufacturer is a medium-sized company, is the owner of the production sites and manages real estate in-house. This theoretical research has focused on different perspectives to look at industrial real estate. From the supply chain perspective the most important premises are logistics centres, warehouses, industrial premises but the majority is run by large international real estate developers and is usually leased. Literature does not discuss company-owned premises. The supply chain articles are US oriented and focus on their large market and those findings should not be directly extrapolated onto the European market (KidderMathews, 2023; JLL, 2023; Polk, 2022). Manufacturing premises are not mentioned in the articles even though they belong to the supply chain. It is suspected that it is easier to gather data from real estate developers than individual companies, which have industrial real estate in their asset portfolio. The second perspective to consider is the non-financial reporting perspective. In the currently developed CSRD reporting there is little mention of real estate. Real estate is mentioned under two points depicted below:

| | | | |
|---|---|---|---|
| | Percentage of assets at material transition risk addressed by climate change mitigation actions | percent | |
| | Total carrying amount of real estate assets | monetary | PILLAR 3 |
| | Disclosure of how potential effects on future financial performance and position for assets and business activities at material transition ris | narrative | |
| | Disclosure of how assessment of assets and business activities considered to be at material transition risk relies on or is part of process to | narrative | |
| | Estimated amount of potentially stranded assets | monetary | |
| | Percentage of estimated share of potentially stranded assets of total assets at material transition risk | percent | |
| | Total carrying amount of real estate assets for which energy consumption is based on internal estimates | monetary | |
| | Liabilities from material transition risks that may have to be recognised in financial statements | monetary | |

Figure 5. Real estate related requirements mentioned in ESRS data points – implementation guide published by EFRAG. Source: www.efrag.org (retrieved: 18.12.2023).

Beyond the two points real estate influence is also present through indicators such as CO2 emissions and energy use. The energy emissions are usually sorted according to three scopes, defined in the GHG (Greenhouse Gas) Protocol. Scope 1 relates to direct emissions, scope 2 to indirect emissions associated with the purchase of electricity, heat or cooling and scope 3 to indirect emissions associated with activities in the value chain (EPA, n.d.). The real estate to be thoroughly analysed in the non-financial report has to be the main business of the company i.e. real estate investors, developers etc. The non-financial report is a very broad and complicated report which is challenging for the companies. The focus is naturally on the main business and actions. Real estate, as mentioned in the definition, only serves as a supporting element of the puzzle and its contribution to company's environmental or social influence could be perceived as insubstantial. The third perspective recognized in this theoretical research is the perspective of ownership. In the case of large logistics centres the real estate can be researched or analysed more easily with a steady access to data collected by the companies. As mentioned by Ristaniemi and Lindholm (2011) manufacturers prefer to own their production sites. This gives them more freedom and flexibility but also puts this part of real estate in the unsearchable 'grey area'.

### 2.1.6 Conclusion

There are a number of distinguishing characteristics that differentiate industrial real estate and its management from corporate or commercial real estate. The costs associated with this aspect of business are relatively low, which places it in a secondary role. In contrast, researchers have highlighted the significance of a comprehensive approach to corporate real estate management. The process should encompass both internal and external factors, thereby enhancing the value of the primary business. The concept of sustainability is increasingly being recognized as one of the added values that CRE can bring to the table. The multifaceted and interrelated nature of CRE makes it an intriguing subject for analysis.

## 2.2 Sustainability

### 2.2.1 What is sustainability?

Sustainability can be defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland,

1987). Even though it might seem as a new concept in fact this way of living has been practiced by indigenous people by tuning in with the natural limits and cycles.

### 2.2.2 Triple bottom line

While sustainability is not a new concept, it has evolved in parallel with the growth of the global economy. Very often it is solely linked to environmental dimensions. But to maintain sustainable development the focus should be spread on the following dimensions: environmental, social and economic. The most popular work on those three dimensions of sustainability is by Elkington (1998). His triple bottom line model addresses businesses and emphasizes that being sustainable is beyond greening and the environmental dimensions. He emphasized the growing role of audits and reporting but added that "this is an extremely complex task, but one which will probably look much easier once we have worked out way through a decade or two of experimentation in sustainability accounting, auditing and reporting". Two decades on, we are still addressing the issue of sustainability reporting.

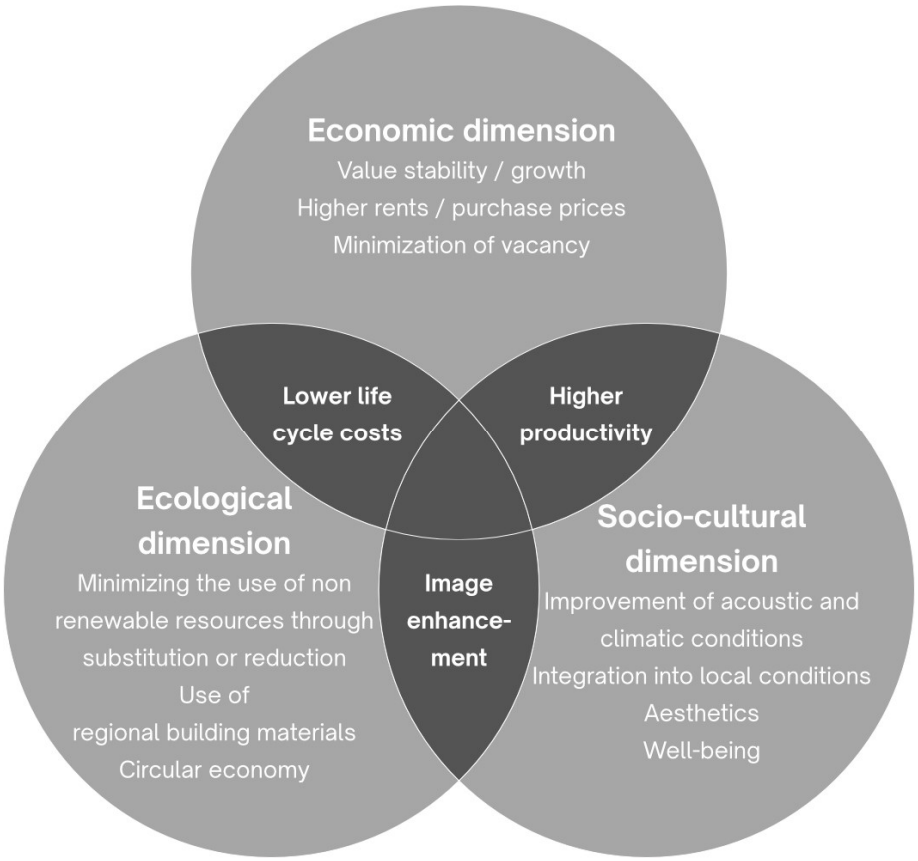


Figure 6. Sustainability in real estate. Own work based on Deutsche Hypothekenbank AG (2017), Schormair&Gilbert (2017). Source: Jager, C. and Benning-Linnert, M. (2022) Market trends and value drivers. In: ESG and Real Estate: A practical Guide for the Entire Real Estate.

### 2.2.3 Sustainability transition

Elkington already foreshadowed the growing importance as well as complexity of sustainability in the three dimensions. An emergent stream in research is sustainability transition. The term gained attention as the incremental change is not believed to lead to sustainability. (Elzen&Wieczorek, 2005) “Achieving sustainability in the broad sense therefore requires a dazzling multitude of changes.” Shove and Walker (2007) state in their article that “For those concerned with sustainability, the idea of transition - of substantial change and movement from one state to another - has powerful normative attractions”. But the authors also rightfully question whether this change is possible in a complex, hegemonic world of neoliberal capitalism. According to Smith et al. (2005) there is hope in the new breed of managers, who will be the key actors in the transitions and will be able to recognize which drivers offer the best leverage for guiding change in a desirable direction. A global survey showed that of over 2500 organizations 65% indicate that sustainability is a top management agenda item (Kiron et al., 2015). The transition theories stem from the need to create new approaches and understandings of movements towards sustainability. The characteristic recognized by Köhler et al. (2019) are: multi-dimensionality; multi-actor process; stability and change; long-term process; open-endedness; values, contestation and disagreement and normative directionality. Transitions to be successful should involve a broad range of stakeholders, usually take long time and since sustainability is a public good, transitions should be encouraged through public policies and regulations.

### 2.2.4 Paradox perspective in corporate sustainability

Köhler et al. (2019) emphasize that firms and other industry actors play critical roles in sustainability transitions. The introduction of complex sustainable transitions at the corporate level can give rise to conflicts. The experience of tensions and conflicts in corporate sustainability is a daily occurrence, “they cannot avoid them if they want to be truly sustainable” (Köhler et al., 2019). Gladwin et al. (1995) define paradox perspective on corporate sustainability as “interrelated yet conflicting economic, environmental and social concerns with the objective of achieving superior business contributions to a sustainable development”. Such challenges are studied within the studies of paradox. Long term success of an organization “requires continuous efforts to meet multiple divergent demands” (Smith&Lewis, 2011). Organizations and decision makers may either respond defensively or proactively to paradoxical tensions (Hahn et al., 2018) and it was noticed that there are tensions between short-term and long-term orientations around corporate sustainability (Slawinski&Bansal, 2015). Researchers also emphasize that companies are focused on an instrumental logic meaning wondering how they can benefit from addressing sustainability concerns and that the language of economics is the dominant language in the discussion (Ferraro et al., 2005). Economic aspect is also dominant because of the quantitative nature of financial goals. Social and environmental goals are more subjective, which makes them more difficult to measure

(Ozanne et al., 2016). Financial incentives can also be seen as main drivers as often "managers seek immediate financial goals from their social and environmental investments". Paradoxical approach is beyond trade-offs because contradictory interrelated elements are considered simultaneously (Van der Byl&Slawinski, 2015). Here again policy makers are addressed to recognize that some contexts produce more paradox than others and that policies have potential to focus on those paradoxes (Ozanne et al., 2016). Looking at the literature on paradox in sustainability management, we can see that the importance of sustainability has grown along with the complexity of its implementation. The interdependencies between different actors, levels and needs lead to new challenges, which are recognized by researchers as paradoxes.

### 2.2.5 Sustainability drivers in industrial real estate

No literature was found on sustainability and drivers of sustainability referring specifically to industrial real estate. Most studies refer to commercial real estate. The focus is mostly put on offices and service real estate, which is confirmed by Ristaniemi & Lindholm (2011). Literature refers mostly to who and why pays attention to renting green spaces – usually talking about offices (Eichholtz et al., 2016). Nevertheless some papers do recognize drivers for sustainable real estate. The findings of literature on drivers of sustainability in CRE are dispersed but include drivers such as cost and energy savings or engagement of company directors (Miras et al., 2015; Hanzhang et al., 2023). Those findings refer to the built environment from various perspectives such as the tenant or facility management perspective, or to the manufacturing sector as a whole, and thus cannot be translated directly to the industrial corporate real estate management.

### 2.2.6 Sustainability reporting

Several world initiatives and summits have been crucial for the development of sustainability reporting such as the report by Brundtland from 1987 or Rio de Janeiro Earth Summit in 1992. In 1990s formalization of reporting began with the Global Reporting Initiative (GRI) which is the most frequently used standard (Dienes et al., 2016). "The aim of the GRI has been to induce a process of standardization and harmonization for disclosures by developing a universally accepted framework for sustainability reporting" (Vormedal&Ruud, 2006). The global regulatory or reporting initiatives were not obligatory and only served as certain guidelines. Currently the global governance is very fragmented which can affect coordination efforts among international institutions and organizations (Van Driel et al., 2022). Each country or geopolitical territory has its own legislation system and is developing its own sustainability development legislation tools. The European Union is a coalition of nations with the primary goal of achieving greater political and economic stability. The European Commission has already developed multiple regulations on sustainability and currently is developing a new non-financial reporting directive. The discussion about

European regulations starts with European Green Deal. The European Union aims to become the world's first carbon-neutral continent, and to achieve this, they have established the European Green Deal objectives. The European Green Deal was introduced at the end of 2019 and can be summarized as follows: “a package of policy initiatives, which aims to set the EU on the path to a green transition, with the ultimate goal of reaching climate neutrality by 2050.” (European Council, n.d.) The Green Deal includes a package of regulations called “Fit for 55” which assumes reducing EU emissions by at least 55% by 2030 (European Council, n.d.). Another initiative included in the Green Deal package is the EU Taxonomy. The European Taxonomy regulation, introduced in 2020, aims to support the objectives of the European Green Deal. It classifies economic activities executed in the EU as green or sustainable. Prior to its introduction, there was no clear definition of these concepts.

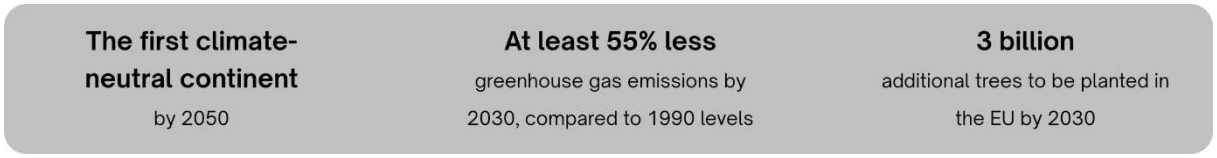


Figure 7. Key figures regarding the European Green Deal. Own work based on: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en (retrieved: 02.01.2024)

The Taxonomy provides a descriptive definition of green and sustainable economic activities. The directive also addresses the issue of greenwashing by enabling market participants to identify and invest in sustainable assets. The European Taxonomy focuses on six environmental objectives: climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems (EU Taxonomy Info, n.d.).


Figure 8. The six environmental objectives of the EU Taxonomy. Own work based on: eu-taxonomy.info (retrieved: 02.01.2024)

Various consultancy firms have addressed the ongoing topic of sustainability, including its impact on real estate. Deloitte published an article explaining the implications of the taxonomy for the real estate sector. The article highlights the sector's focus on ownership, new buildings, and commercial real estate. The objective is to optimize the

contribution of buildings to Europe's climate change goal by transforming existing buildings and constructing new ones to a net-zero carbon standard (Deloitte, 2021). Real estate companies are required to prepare non-financial reports that include aspects of construction, renovation or acquisition that significantly contribute to climate change mitigation. The term 'substantially' is vague and subject to discussion. However, real estate companies must efficiently collect data related to their impact on the climate. The EU Taxonomy affects the business models, market demand, and financing conditions of real estate companies (Deloitte, 2021). Consultancy firms primarily focus on companies whose core business is real estate, and do not extensively discuss the impact of real estate on companies with other core businesses. The taxonomy collects data on energy emissions, where real estate assets are one of the sources of emissions. Additionally, ESG standards can be used to ensure high-quality construction of new buildings and maintain the quality of real estate assets.

The aforementioned initiatives by the European Union serve as guidelines and general direction of action but are not bonding. The system of financial reporting tools has been in place for many years and is quite developed. It is surprising that the non-financial tools have not been properly developed until now. The predecessor of the CSRD was the Non-Financial Reporting Directive (NFRD) (Waas, B., 2023). Now the EC, together with a private advisory group EFRAG (European Financial Reporting Advisory Group), is introducing the CSRD, which is part of the European Green Deal. It was under review and was supposed to come into force in 2024 and oblige companies to report in 2025. In February 2024 it was decided to postpone the beginning of reporting to 2026 (European Commission, 8.02.2024). The new directive means that the companies will be bound by law to disclose their impacts transparently and consistently, reducing the risk of greenwashing. This change can be perceived as a burden but also it could be treated as a great opportunity to show positive steps towards addressing the company's impact on the environment – improving investor confidence and aligning with other stakeholders' expectations (SouthPole, 2023). Parallelly to CSRD the EC has been developing European Sustainability Reporting Standards (ESRS). The ESRS was developed as a CSRD supporting tool. Companies are supposed to report using a double materiality perspective in compliance with ESRS (EFRAG, n.d.). EU has recognized that "buildings are the single largest energy consumer in Europe" (European Commission, n.d.) and therefore have addressed this issue with introducing energy labelling of buildings through an Energy Performance of Buildings Directive. The first documents on energy performance of buildings were published in 2010 and were still under development. The most recent revision of the EPBD was done in 2023 and the directive should be adopted in 2024. The EPBD promotes policies that will help: "achieve a highly efficient and decarbonised building stock by 2050; create a stable environment for investment decisions, enable consumers and businesses to make more informed choices to save energy and money" (European Commission, n.d.).


Figure 9. Key facts on energy and EU buildings. Own work based on: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en (retrieved: 13.03.2024)

Large banks already use this rating, for example, to decide whether to give a real estate loan to a particular company. Strategically, it would be a good idea for companies to have an EU energy class rating for the assets in their portfolio.

There are multiple sets of regulations, directives and acts being published by the EC in order to promote sustainable corporate governance. Naturally, the plurality of acts and regulations arises many questions and uncertainties. Advisors are already looking into the topic and are publishing articles on it advising companies to start preparing for this directive (Colot, 2023). “Many organisations already voluntarily publish a growing amount of sustainability information to meet the increased interest of their shareholders as well as their internal and external stakeholders” (Dienes et al., 2016). Organisations starting early have the chance to establish appropriate structure and processes. It is also crucial for them to collect the correct data done through a multi-source approach. According to advisors at South Pole (2023) it is advised to start early with the process. The earlier the company starts the more advantage it gets. The aforementioned regulations are first steps towards more sustainable future and it is impossible to cover all fields of corporate actions at once. That is the case for real estate, which plays a significant role in the discussion on sustainability and climate change. As of now reporting directives cover the actions related to the main business of a given company. This means that real estate assets which are mostly under scrutiny are the ones which belong to real estate developers and owners. Nevertheless, a large proportion of real estate belongs to various companies where buildings play a supporting role in the business, a large proportion belongs to industrial companies.

### 2.2.7 Double materiality

As Elkington predicted, the role of reporting will become increasingly important in the sustainability transition, and we are currently entering the new era of non-financial reporting. One of the points that companies have to comply to within the CSRD is the double materiality assessment. Concept of double materiality first came from creating a union between the impact materiality and financial materiality. The definition of double materiality is not yet settled and agreed upon and it is definitely still up for debate. It is becoming prevalent through EFRAG’s publications on ESRS. In their drafts of assessment guidance we can find chapters on double materiality and the concept is being reviewed with each new edition of the guidelines. In the latest publication (as of

May 2023) they explain double materiality as covering both the impact of organisation on people or environment as well as the material information about risks and opportunities related to a sustainability matter (EFRAG, 12.2023). In an earlier publication a chapter on double materiality suggests that organisations should take into account their "dependence on the availability of natural and social resources at appropriate prices and quality, independently of its potential impact on those resources" (EFRAG, 11.2022).

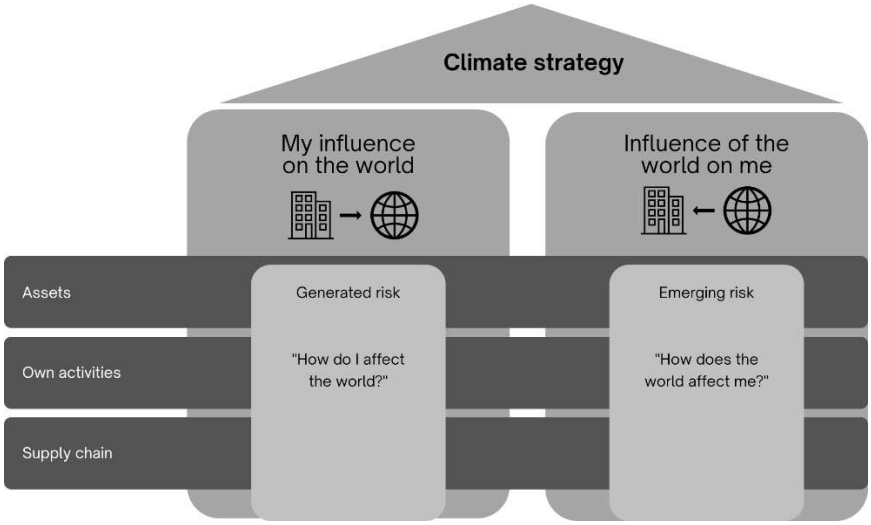


Figure 10. Perspectives of the climate strategy. Own work based on: PwC, 2021 in: ESG and Real Estate: A practical Guide for the Entire Real Estate and Investment Life Cycle.

The concept of double materiality has been covered by consultants and made more accessible, as illustrated in the graph above, which is based on a 2021 PwC report. This graph demonstrates the two dimensions of influence: influence on the world and the world's influence on others. This can be translated to different scales such as corporate, real estate or even household. Ideally, enterprises should consider the two dimensions holistically. Sustainability also means taking into account physical risks related to climate change. Recognizing those risks is important in addressing the sustainable change holistically as they refer both to the environmental and social aspects. Failure to address the risks associated with climate change can jeopardize the safety and well-being of employees (Rötmmer et al., 2022). The concept of double materiality is new and has emerged with the growth of non-financial reporting. There is currently a lack of peer-reviewed research on double materiality, making it challenging to draw definitive conclusions. Organisations start to recognize double materiality as an important part of their strategy. First of all, double materiality assessment serves as a basis for defining organisations' sustainability reporting scope. Through double materiality assessment the organisation can determine its biggest sustainability risks and opportunities, also in relation to their real estate assets.

### 2.2.8 Conclusion

In literature, media, and everyday life, we are surrounded by the concept of sustainability. It is clear and very ambiguous at the same time and that is why approaching it has become quite challenging. One of the popular approaches to sustainability was introduced by Elkington, where he emphasizes the balance between economic, ecological and social sustainability. The movement toward sustainability is highly dependent on the role of top management positions (Smith et al., 2005), involves multiple actors and is a lengthy process (Köhler et al., 2019). Multiple needs and perspectives lead to conflicting values. One such conflict is the quantitative financial approach versus the subjective goals of environmental sustainability. Companies have been grappling with new regulations imposed on them, along with emerging concepts such as double materiality. Sustainability in industrial real estate is not often mentioned, mainly due to its secondary role.

## 2.3 Theoretical framework

The literature review is further used as a basis for the theoretical framework for this research. Particularly relevant topics present in the literature were specified in the table below:

| **Topics recognized in the literature review** |
|---|
| Role of management |
| Policies and regulations |
| Long term approach |
| Multiple actors involved |
| Being active versus reactive |
| Emerging importance of physical risk assessment |
| Special role of industrial real estate |
| Role of customers |
| Role of competitors |
| CREM is highly economically driven |
| Sustainability is hard to measure |
| Sustainability is one of the added value of IRE |
| Sustainability is not only about environment |
| Managers look at sustainability as investment |

Table 2. Topics distinguished in the literature review. Own work.

Further synthesis led to grouping into main categories:

| Topics recognized in the literature review | Category |
|---|---|
| Role of management | stakeholders |
| Policies and regulations | regulations |
| Long term approach | time |
| Multiple actors involved | stakeholders |
| Being active versus reactive | time |
| Emerging importance of physical risk assessment | risk management |
| Special role of industrial real estate | CRE |
| Role of customers | stakeholders |
| Role of competitors | stakeholders |
| CREM is highly economically driven | financial |
| Sustainability is hard to measure | quantification |
| Sustainability is one of the added value of IRE | sustainability |
| Sustainability is not only about environment | sustainability |
| Managers look at sustainability as investment | stakeholders/financial |

Table 3. Topics distinguished in the literature review and further grouped. Own work.

Taking into account the literature review, as well as the limitations of the research methods, four distinct themes were selected: stakeholders, regulations, financial and double materiality. Literature on corporate real estate management also put emphasis on the internal and external dimension, which is emphasized in the theoretical framework. The theoretical framework is summarized and presented in the graph below:


Figure 11. Theoretical framework for the research. Own work.

# 03

# Research methods

# 3 Research methods

## 3.1 Research questions

Main research question:

**What are the external and internal drivers of sustainability in corporate real estate management of a manufacturing company?**

It is followed by four sub questions:

9. Who are the most important stakeholders driving the sustainable change in corporate real estate management?
10. What are the financial reasons for sustainable implementation in industrial corporate real estate management?
11. What is the role of European and national regulations in sustainability implementation in industrial corporate real estate management?
12. Is double materiality taken into account in the aspect of climate change risk management?

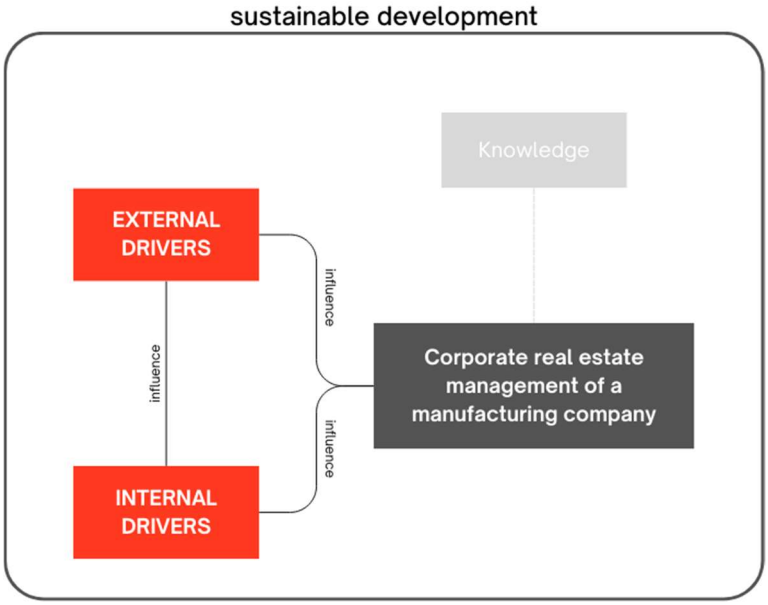


Figure 12. Conceptual model for the research. Own work.

## 3.2 Research methods

To answer the research question this thesis followed an exploratory research. “Exploratory research is necessary when very little is known about the topic being investigated, or about the context in which the research is to be conducted” (Blaikie&Priest, 2019). The following chapter explains what methods were applied, what data was gathered and how it was analysed. The research used single case study method conducted within Wacker Neuson SE. The research was divided into three steps which are explained below.

### 3.2.1 Preparatory phase

The first step laid the groundwork for further case study research. Preparation included literature and market research on topics related to corporate real estate, industrial real estate and sustainability within these topics. The research was conducted through the analysis of papers, articles and discussions with industry professionals. The preparation phase also included brief research on the issues within the case study company. This part included online research as well as brief interviews with employees involved in CRE or sustainable strategies at the organization. The preparatory phase served as preparation and background for further in-depth research. The results of the preparatory phase were used to determine the theoretical framework for the research and then to further analyse and conclude the results of the case study research.

### 3.2.2 Fieldwork phase

Step two involved an empirical inquiry: case study. The case study can be defined as: “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 2003). According to Schramm (1971) “the essence of a case study (...) is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result”. For this research a single case study design was chosen. It was conducted within one organization: Wacker Neuson SE. As mentioned in the introduction it is primarily a manufacturer of small and medium sized construction equipment.

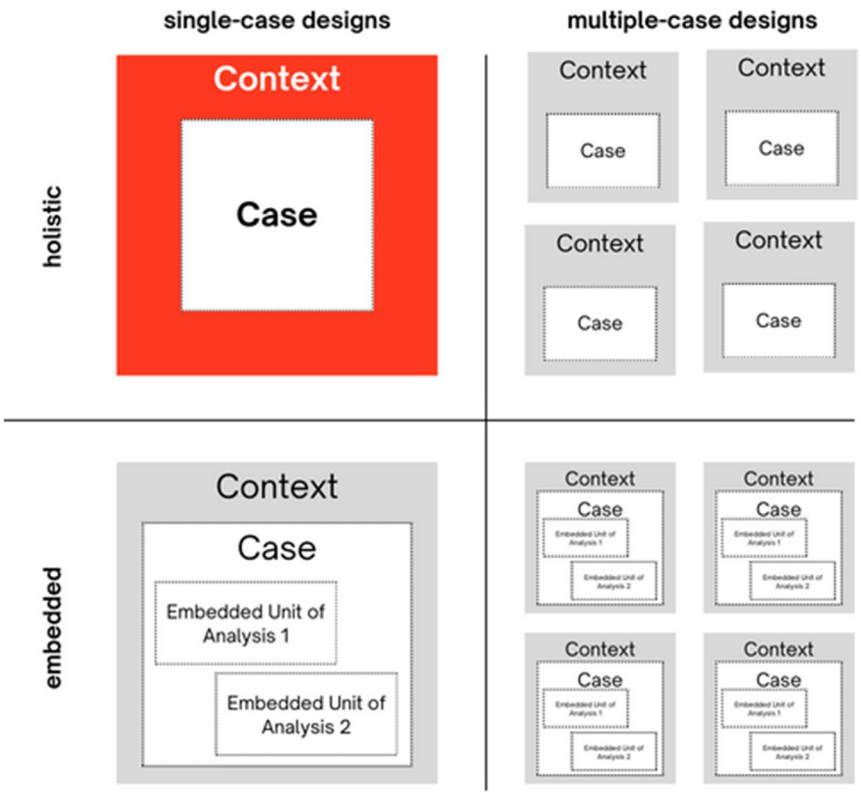


Figure 13. Basic types of designs for case studies – the chosen type of case study for this research is highlighted. Own work based on Robert K. Yin (2003)


Figure 14. Case study steps. Own work.

### 3.2.3 Theorizing phase

The final stage of the process involved the analysis of the case study results, discussion of these results and the formulation of a conclusion. The discussion phase involved the referencing of the theoretical background, which was established during the preparatory phase and the correlation of the results against this theoretical background. The conclusion provided an answer to the research questions. The three steps are also depicted in the following graph explaining the method:

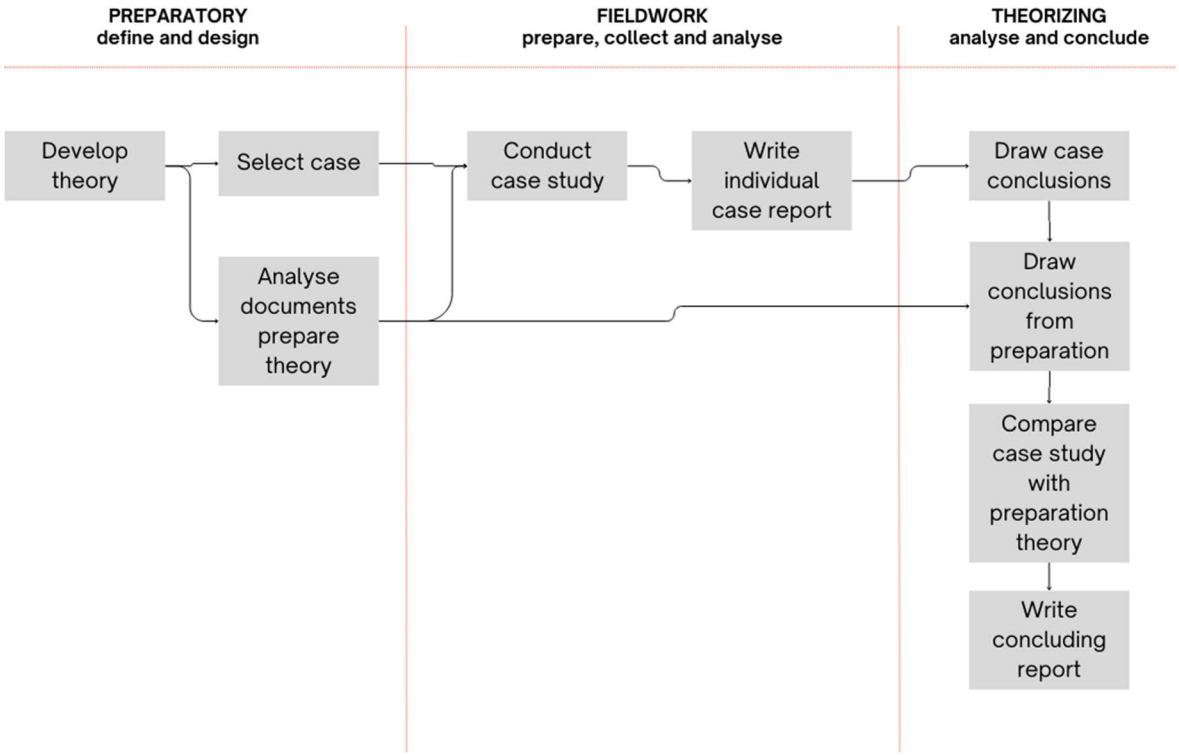


Figure 15. Three steps of the research method: define and design, prepare collect and analyse, analyse and conclude. Own work based on Robert K. Yin (2003).

### 3.2.4 Limitations and accuracy of the case study method

One of the limitations of this research was the difficulty to properly collect data from multiple sources. On one hand triangulation of data gather is important but at the same time each method requires similar level of expertise for equally valuable data. For this case study two sources of data have been chosen to ensure triangulation: document analysis and interviews. Each of the sources of evidence has weaknesses that the researcher should be aware of. The documentation can be of low retrievability, is subject to biased selectivity, reflects bias of an author and may have deliberately limited access. Interviews may be biased due to poorly constructed questions, may have biased responses, inaccuracies due to poor recall or may be subject to reflexivity (Yin, 2003). Those weaknesses have to be taken into account when designing the specific elements of a research proposal. The accuracy and trustworthiness of the research is described according to the four criteria of trustworthiness by Guba (1981). Credibility can be ensured through adoption of appropriate, well recognised research methods, description of the researched topics based on thorough literature review and previous research and through feedback sessions with the research mentors. Transferability is provided through detailed description of the phenomenon and the context of the conducted research. Dependability is ensured by method description and accessibility to method tools in the appendix to allow study to be repeated. Confirmability is secured by admission of researcher's position towards the researched organisation, recognition of shortcomings in the study's method and thorough method description, including diagrams and documents used to conduct the research, which allows for repeatability.

## 3.3 Data collection

This case study method involved qualitative data collection. To ensure validity and reliability of the data the triangulation approach will be applied through choice of various sources of data and by nonconvergence of the data collection methods. The two data collection methods are presented below. The first method involved secondary data (documentation) and the two following involved primary data collection (interviews).


Figure 16. Case study method with three nonconvergent sources of evidence with three separate conclusions. Own work based on Robert K. Yin (2003).

### 3.3.1 Documentation

To access corporate documents first research was done on what kind of documents are already accessible. The relevant documents would include: strategy documents and documents on corporate real estate including corporate real estate portfolio, strategy and energy use as well as public reports on sustainability. The use of documents in case study is to confirm and augment data from other sources (Yin, 2003). Data from the documents can be used to improve interview questions. When collecting documents, it is important to remember that each document has a specific purpose and audience. As an observer, it is important to remain thorough and objective. The data will be a set of digital documents together with notes.

### 3.3.2 Qualitative interviews

Primary data was obtained through conducting semi-structured in-depth interviews with relevant stakeholders. The interviews were conducted with employees who are directly involved in the development of the CRE portfolio and work on different levels in the corporation. The criteria of choice of the interviewees was based on their involvement with the development of the production sites. Contact began with the head of the CRE department and the project manager at the CRE. The project manager suggested talking to people involved in energy and reporting as well as to directing managers and facility managers of each of the plants. During introductory talks with the energy and reporting employees other colleagues were suggested such as risk manager or strategy manager. On top of that to get an overview of the corporate strategy it was decided to talk to the CEO. All the interviewees were contacted directly via email. Some contact was supported by the project manager and company mentor Matthias Obst. Interviews took

place during the period 3.2 – 3.10. The interviewees and their functions are presented in the table below:

| | | |
|---|---|---|
| FACILITY MANAGERS | Interviewee 1 | Facility manager at a production site |
| | Interviewee 5 | Facility manager |
| | Interviewee 6 | Facility manager at a production site |
| | Interviewee 14 | Sustainability and energy consumption reporting assistant at production site |
| MANAGING DIRECTORS | Interviewee 2 | Managing director at a production site |
| | Interviewee 12 | Managing director at a production site |
| | Interviewee 15 | Managing director at a production site |
| CRE | Interviewee 9 | Head of Corporate Real Estate |
| | Interviewee 11 | Senior associate at Corporate Real Estate |
| CORPORATE STRATGEY AND MANAGEMENT | Interviewee 3 | Manager for energy and environment |
| | Interviewee 4 | ESG manager |
| | Interviewee 7 | Controller, risk officer |
| | Interviewee 8 | Management trainee |
| | Interviewee 10 | Chief executive officer |
| | Interviewee 13 | Director corporate strategy |
| | Interviewee 16 | Head of investor relations and corporate communications |

Table 4. Interviewees and their functions. Own work.

The aim of the interviews was to understand the sustainability approach of this corporation, through their employees' attitudes as well as through strategies that are applied. Emphasis was put on sustainability attitude towards the real estate assets and solutions within the production sites. Interview protocols were written beforehand with open-ended questions and main themes to be discussed during each interview. The interviews were recorded. The data set consists of interview recordings, transcripts and interview notes.

### 3.3.3 Case study database

To ensure an organized data collection process and facilitate data analysis, a case study database was created. The database consists of a digital folder divided into subfolders categorized by the type of data: (1) case study documents, (2) case study notes, (3) interview transcripts, and (4) case study protocols.

## 3.4 Data analysis

After gathering the data the research moves onto data analysis, which according to Robert K. Yin (2003) "consist of examining, categorizing, tabulating, testing, or otherwise recombining both quantitative and qualitative evidence to address the initial propositions of a study". The author also emphasizes that this task is difficult because "the strategies and techniques have not been well defined" (Yin, 2003). In this subchapter a general strategy for analysis is explained. It is important to have a general strategy in mind already during the data collection stage. This can affect the quality of the research significantly.

It is also important to emphasize that there is no particular moment when data analysis begins as it is difficult to entirely separate data collection from analysis (Stake, 1995). That is why the analysis will have different levels of maturity and will start with early analytic work, which is conducted concurrently with data collection.

### 3.4.1 Early data analysis

Early data analysis is based on framework by Miles and Huberman (1994) and included three methods: contact summary sheet, codes and coding and memoing.

Contact summary sheet – is a single sheet with some focusing or summarizing questions about an interview. A specific form was prepared beforehand and was filled out during and after each interview. It answers questions such as: what situations/people were involved? What were the main themes? Which research question and which variables did the contact address mostly? What new speculations emerged? What should I focus on during the next contact?

Codes and coding - codes are tags and labels used to assign meaning to descriptive information gathered during a study. They can be in the form of words, phrases or sentences. The codes were used to organize recurring themes.

Memoing – this method involves writing short memos to myself (the researcher) in order to tie together different pieces of data into a recognizable cluster and to show that the data are instances of a general concept. The memos go beyond codes and also include personal or methodological remarks. It includes remarks about quality and quantity of data.

### 3.4.2 Exploring and describing

The next step in the analysis will be exploring and describing. According to Bernard (1988) describing means “making complicated things understandable by reducing them to their component parts” and explaining can be defined as “making complicated things understandable by showing how their component parts fit together according to some rules”. The process of explaining, as suggested by Rein and Schon (1977) could go as follows: first telling a story, then constructing a map formalizing the elements of the story and locating key variables and finally building a theory or a model. When it comes to qualitative research it is important to apply a certain display method. The gathered data is in the form of plain text which is difficult to analyse. Proper display allows for a fruitful explanation process.

This research used the conceptually ordered displays to order the data display by concepts or variables. MS Excel computer software supported the exploration process. The process of data display follows three steps: building the display, entering the data, drawing conclusions. The most important part is to build a display that will work for the given research questions and will result in satisfactory conclusions. The process of display building is an iterative process that took place in the early analysis stage.

### 3.4.3 Explaining

This part of analysis is taking a step further from understanding ‘what’ is happening at the company in regard to sustainable real estate portfolio. In this step the question ‘why’ certain things happen will be addressed. In this step also knowledge acquired in the preparatory phase of the research is be used. The findings are juxtaposed against the existing body of knowledge.

The whole analysis method is presented in the figure below together with the connection to the data collection stage.

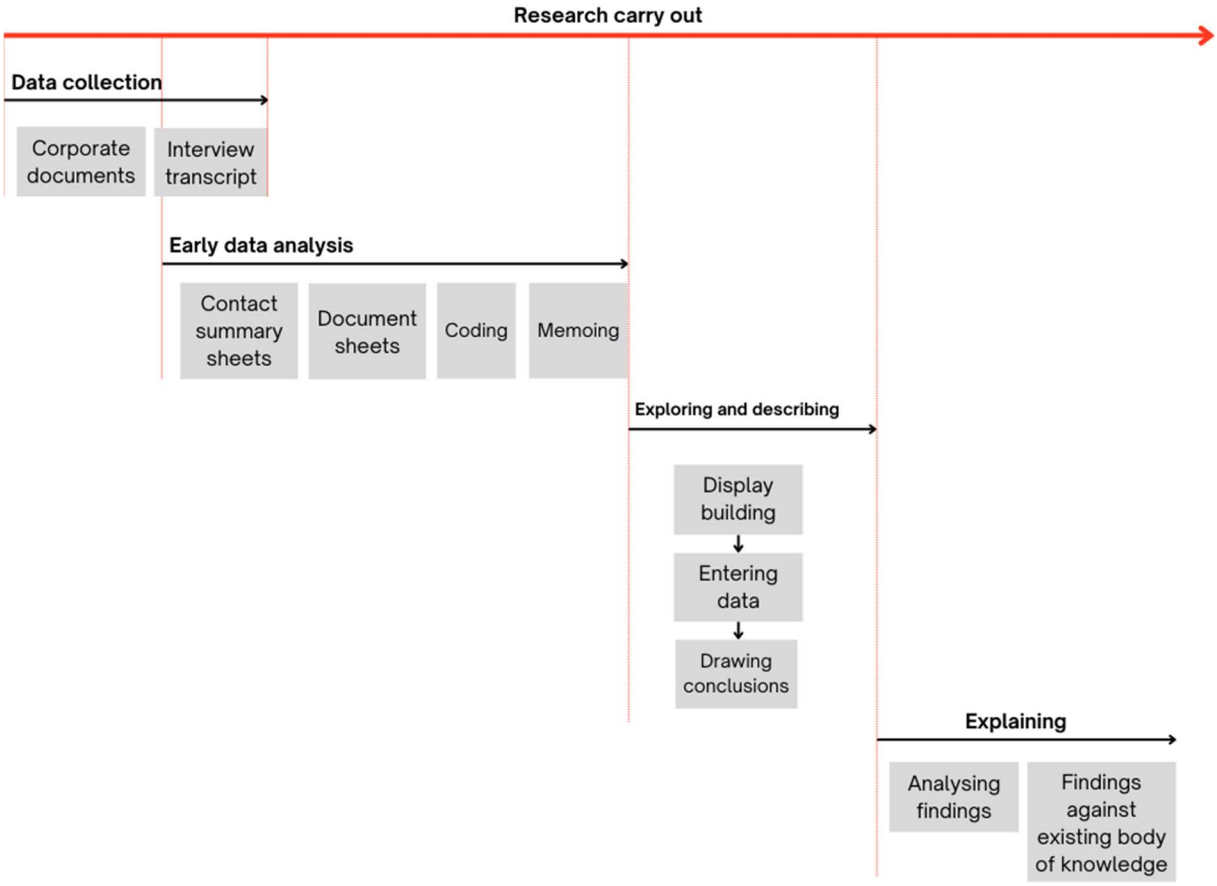


Figure 17. Moving from data collection to data analysis. Own work.

## 3.5 Research plan

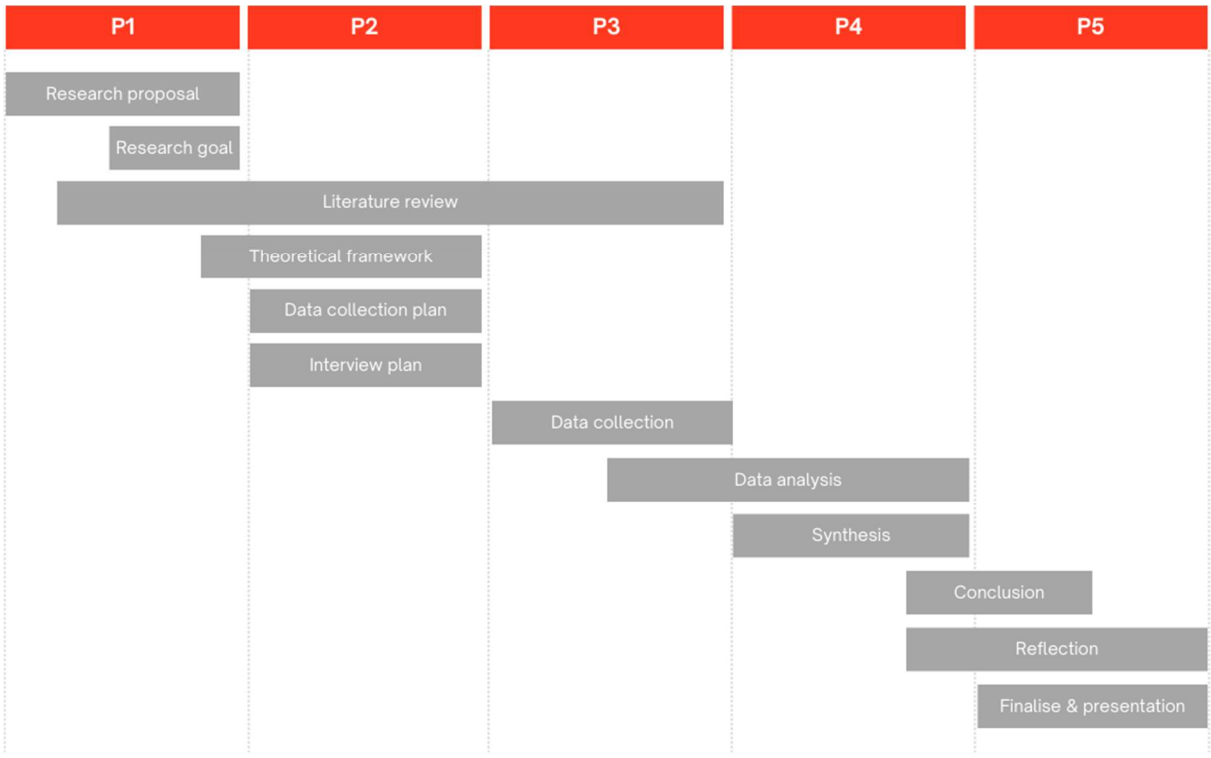


Figure 18. General graduation timeline. Own work.

Figure 18 represents the timeline of this graduation thesis. The graduation begins with P1 where the research goal is clarified and research question and methods specified. Already in P1 process of reviewing relevant literature begins. Later on theoretical framework is set together with plan for data collection and interviews. Afterwards data is collected. The following step is continuation of data collection in P3 and later data analysis. P4 focuses on thorough data analysis, producing findings and finishing at conclusions. P5 period serves as time for reflection and thorough review of the work to create a coherent research.

Figure 19 focuses on period from P3 to P5 and shows in more detail the plan for this research. The numbering in the timeline refers to the official TU Delft academic calendar accessible at: https://www.tudelft.nl/studenten/onderwijs/academische-jaarindeling. P3 begins with preparation for data gather. Later on interviewees are contacted, interviews are scheduled and conducted. P3 ends with early data analysis and early findings. Further in P4 data is analysed thoroughly, findings are described and juxtaposed against the existing body of knowledge. P4 ends with conclusions on the research and answering the research questions. P5 period focuses on reflecting on the research, drawing more conclusions and refining the research report.

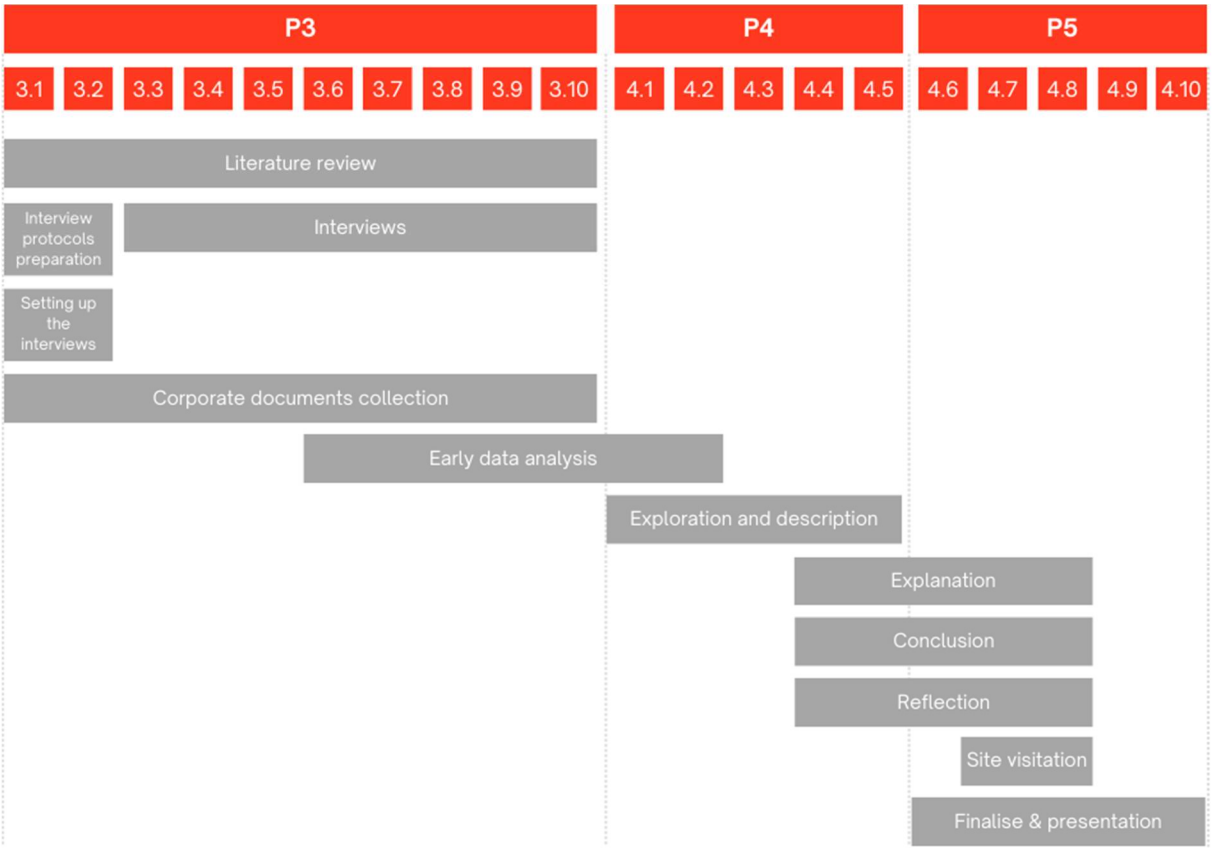


Figure 19. Detailed graduation timeline for P3, P4 and P5. Own work.

## 3.6 Research output

### 3.6.1 Goals and objectives

The aim of this research is to understand whether stakeholders, regulations, financial drivers and risk management drive the sustainable change of the real estate portfolio of a manufacturing company  Wacker Neuson SE. The goal is to deepen the understanding of sustainability drivers for industrial real estate managers of companies with real estate playing solely an operational role.

### 3.6.2 Dissemination and audiences

The primary audience of this graduation thesis is the company Wacker Neuson. Apart from the company the research is also targeted at employees and managers of other similar companies, which are subject to European sustainability regulations. The conclusions of this thesis might be applicable to other companies' corporate real estate portfolio management.

## 3.7 Personal study targets

I have a strong interest in environmental sustainability. I believe that a proper approach requires multiple stakeholders to be involved in the change. I also believe that promoting a sustainable approach is very important, but not as important as taking actual action. I believe in the power of individual action, but without proper cooperation of governments and companies, individual action would be just a drop in the ocean. That is why the actions taken by the European Union are significant and should be taken seriously by both individuals and corporations. Another topic that interests me is corporate real estate. My interest began with a Real Estate Management course at TU Delft. What I particularly appreciate about CRE and CREM is their multi-dimensionality. It is fascinating that within CRE, managers are involved in the daily operations of various companies. Almost every company has a portfolio of real estate assets that serve the main business and need to be maintained properly. Real estate assets have a direct impact on the success of daily business operations. In this research, I would like to combine my two interests: sustainability and corporate real estate. In particular, I would like to study the manufacturing industry and the integration of sustainability in real estate in this sector because of the lack of proper literature on this topic. Real estate of manufacturing companies constitute a significant proportion of overall real estate assets and thus should not be omitted in the discussion on sustainability of corporate real estate. The company Wacker Neuson, with their varied real estate portfolio, inspired me to research this topic. This graduation project also presents an opportunity to act as a consultant to the company to assess which factors drive the sustainable real estate management strategy the most. Furthermore, I am just a student myself, but through this research I want to contribute to the change towards higher environmental sustainability in at least one company.

# 04

# Findings and discussion

# 4 Findings and discussion

## 4.1 Methods of analysis

### 4.1.1 Interviews analysis

The findings are based on 16 interviews conducted with employees of Wacker Neuson. The employees chosen for the interviews are related to real estate, facility management of the production sites, environmental strategy and corporate strategy. The table below categorizes the interviewees into four groups of professional focus: facility management, directing management of plants, corporate real estate and corporate strategy and management.

| | | |
|---|---|---|
| FACILITY MANAGERS | Interviewee 1 | Facility manager at a production site |
| | Interviewee 5 | Facility manager |
| | Interviewee 6 | Facility manager at a production site |
| | Interviewee 14 | Sustainability and energy consumption reporting assistant at production site |
| MANAGING DIRECTORS | Interviewee 2 | Managing director at a production site |
| | Interviewee 12 | Managing director at a production site |
| | Interviewee 15 | Managing director at a production site |
| CRE | Interviewee 9 | Head of Corporate Real Estate |
| | Interviewee 11 | Senior associate at Corporate Real Estate |
| CORPORATE STRATGEY AND MANAGEMENT | Interviewee 3 | Manager for energy and environment |
| | Interviewee 4 | ESG manager |
| | Interviewee 7 | Controller, risk officer |
| | Interviewee 8 | Management trainee |
| | Interviewee 10 | Chief executive officer |
| | Interviewee 13 | Director corporate strategy |
| | Interviewee 16 | Head of investor relations and corporate communications |

Table 5. Interviewees according to their professional function. Own work.

After the interviews were conducted, they were transcribed and prepared for further analysis. They were then analysed according to the developed theoretical framework. The results of the analysis were organized in an Excel file along with the emerging themes.

### 4.1.2 Document analysis

The second source of data for answering the research questions was document analysis. The documents selected focused on energy and environmental issues in relation to all aspects of the sites. The table below summarizes the chosen files:

| No. | Original name of the document | Short description | Date of publication / latest version | Internal/external | Published by | File format |
|---|---|---|---|---|---|---|
| 1 | *Creating Sustainable Success. Non-financial Group Report 2023* | non-financial report published on the official website | 21.03.2024 | External | WN Group | PDF |
| 2 | *Sustainability Actions* | short video about corporate sustainability actions | 28.03.2024 | Internal | WN group | Video |
| 3 | *Qualitäts-, Energie- und Umweltmanagement* | general environmental goals for the WN group | 27.09.2023 | Internal | WN Group | PDF |
| 4 | *Klimarisiko- und Vulnerabilitätsanalyse* | climate risk and vulnerability assessment | 19.10.2023 | Internal | WN Group | PDF |
| 5 | *Aktionsplan-Energie-Umwelt* | file focusing on sustainable investment costs | 2021-2024 | Internal | Each production site | Excel |
| 6 | *Kennzahlen_Energie+Umwelt* | key data on energy use, waste production, water use, gas use | 2021-2024 | Internal | Each production site | Excel |
| 7 | *Energie-und Umweltaspekte* | overview of aspects related to energy and environment | January 2024 | Internal | Each production site | Excel |
| 8 | *Kontext_Chancen_Risiken_Stakeholdermanagement* | risks, opportunities and managing stakeholders | January 2024 | Internal | Each production site | Excel |
| 9 | *Management_Bewertung (ISO 14001 & 50001)* | ISO 14001 & 50001 evaluation | April 2024 | Internal | Each production site | PP presentation |

Table 6. Chosen corporate documents for the analysis. Own work.

Each document is described shortly below:

1. The first document is the non-financial report of the Wacker Neuson Group which, is published on a yearly basis and is available on their website. The document focuses on the sustainable goals of the Wacker Neuson Group, what measures are taken and what goals are achieved so far. The document also refers to European regulations such as the EU Taxonomy.
2. Sustainability Actions is an internally published video that aims to popularise among employees the actions taken to ensure sustainable growth in the company. Key internal stakeholders are interviewed in the video.
3. Short document on general environmental goals for the whole Wacker Neuson Group.
4. Fourth document is a risk assessment conducted by an external consultant. The risk assessment is done for 20 chosen WN locations. Assessment is done for each site separately. the assessment takes into account: temperature, wind,

water and solid materials (e.g. soil degradation, landslide etc.) It was imposed by the EU Taxonomy and was done recently.

5. An Excel file is created separately by each production site. The file focuses on the evaluation of the costs of sustainable investments. The investments are described, evaluated and assessed in terms of their cost.
6. Key figures on energy use, waste production, use of gas and use of electricity, measured separately for each production site.
7. Excel sheet created separately for each production site, which focuses on overview of various aspects related to sustainability such as electrical power, waste production, water use or gas use. Each aspect is analysed through risks and opportunities and relevance for stakeholders. The aspects are evaluated according to a given scale and importance of each of the aspects is assessed.
8. Excel sheet created separately for each production site. The focus is put on stakeholder management but also risks and opportunities. Important stakeholders related to sustainability are listed and then are evaluated according to the stakeholder power-interest matrix. It is also stated what actions and through which channel of communication should be done towards each of the stakeholders.
9. Evaluation of ISO 14001 and 50001 done separately for each site. It includes evaluation, opportunities, risk analysis, regulatory or legislative risks. It also describes the sustainable measures already implemented at each site. The assessment includes both qualitative and quantitative data.

The documents were read thoroughly and findings were arranged according to the four categories distinguished in the theoretical framework.

## 4.2 Data analysis and discussion

The data analysis is organised by source, i.e. the results are reported according to the respondents and documents.

### 4.2.1 Stakeholders

The interviewees have mostly put emphasis on the change of the executive board and its attitude towards sustainability: "It has to start always in the C-level" (Interviewee 4). The role of the CEO was emphasised through stating "the CEO is very active in the sustainability project and in former times the others were just looking for the numbers and how much does it cost to improve something" (Interviewee 3) or “a key driver in it, our CEO as well” (Interviewee 8). This confirms the statement by Smith et al. (2015) that the new breed of managers is crucial in the sustainable transition and the statement by Manning&Roulac (2001) about the role of the senior management. Miras et al. (2015) also identify the engagement of company directors as one of the most significant sustainability driver. The CEO and executive board are directly responsible for the non-financial report (document 1) which proves their involvement in the sustainability topic.

Also they were mentioned as an important stakeholder within the stakeholder matrix (document 8). The role of sustainability-oriented leadership within an organisation is of significant importance in facilitating sustainable change. Such leadership can attract talent, alter the mindset of employees and direct their attention towards sustainability within the corporate strategy. In contrast to the prevailing tendency for CEOs to prioritize maximizing shareholder value and profit maximization, there is a growing trend towards a more holistic approach to business leadership. Elham Chehaimi (2023) notes that leaders embrace the concept of the triple bottom line, which seeks to achieve balance between profit, people and planet. When speaking about the leadership the importance of involvement of women was also mentioned in the interviews. It was pinpointed that the industrial sector is a very specific sector, mainly dominated by male stakeholders and customers, whose primary interest might not be in sustainable growth. Women involved at the managerial level pointed out that the character of the industry can be an obstacle and that involvement of women could speed up the pace of change. Studies show that firms with a diversified leadership teams are more effective than others at sustainable strategies (Glass et al., 2015). A report by the European Investment Fund shows that women-led companies have higher environmental, social and governance scores, and that companies with more women in senior positions have a better track record of adopting green practices (Pavlova & Gvetadze, 2023). The women's impact on sustainability is recognized in literature but at the same time it is noticed that there is not enough women in charge to drive this change. Nevertheless, the changing role of business leaders has been acknowledged in the academic literature and was confirmed in the interviews as an important driver.

The interviewees recognized the EU as the second most important stakeholder, driving the change through the regulations such as CSRD: "I think the main driver right now is the EU" (Interviewee 8) or "they weren't the biggest stakeholder in the past but especially since like one year I think they're [EU] the main stakeholder at the moment " (Interviewee 4). Document 8, focusing on stakeholder management, did not recognize the EU but the government was emphasized in the power-interest matrix.

Interviewees mentioned the employees as the next most important stakeholder group affecting the change the most. They involvement is encouraged by the proper leadership. This was confirmed by the interviews. This is consistent with the findings of Kim et al. (2016), which indicate that employee involvement enhances productivity and more effective resource management. They should be involved in the process as sustainable change requires their engagement. It was stated that "employees should be interested in or are usually interested in that topic [of sustainability]" (Interviewee 4) or that "it is important to get them [employees] on board" (Interviewee 9). The involvement of employees was especially emphasized within one production site in Germany. There is a system which allows all employees to suggest sustainable solutions, in all fields (including production or real estate). "Everyone has the opportunity to submit a

suggestion for improvement, it doesn't depend on the position" (Interviewee 1). The ideas are later evaluated and are often being implemented. This finding is not confirmed by document 8 in which the employees are of less importance compared to other stakeholders. The special employee groups which were found important in document 8 include management and facility managers.

Among mentioned drivers were also customers, who value sustainable attitude of the companies but it regards to sustainability of a company as a whole. "I think it's driven by various stakeholders, I think it's customer driven so it's the customers that require and demand from us to be more sustainable [in general]" (Interviewee 13). In document 8 the customers were mentioned to 'participate' in the energy and environmental aspects.

The external stakeholders include the EU, the government, the customers and the competition. Document 8 confirms the importance of the government and the customers but less emphasis is put there on the competition. The interviewees did not mention the shareholders unless they were asked about it. "I think it's too far from the main business [real estate] and it's nice knowing that WN is a sustainable company but I think they [shareholders] do not have enough knowledge" (Interviewee 3). This stands in contrast to a link underlined by Ristaniemi and Lindholm (2011) between CRE and shareholders' wealth. The direct correlation between the two was not identified. The stakeholders' foremost priority is the financial well-being of the company and sustainability is in that regard not a priority for them.

Lastly interviewees mentioned the competition, especially from the automotive industry, which can serve as an example for them: "So I think the sustainability changes are competition forced" (Interviewee 9).

If we look at internal stakeholders the most important ones are the executive board and the employees. The reference to customers and competitors aligns with the observations made by Manning&Roulac (2001). The omnipresence of the concept of sustainability and the growing social awareness affect not only employees' attitudes but also customers' expectations. The change in customers' attitudes can be confirmed by the so-called "Greta effect", i.e. raising public awareness mainly through social media (Mede&Schroeder, 2024). This trend is more prevalent in industries such as the automotive industry, which was frequently mentioned by respondents. However, the trend of customer focus on sustainability is shifting to other industries as well. The interviews revealed that customers are driving sustainability change as they become more aware and demanding of sustainability. This is in contrast with the findings from document 8 where the power and interest of competition is less important.

The management group of respondents mostly recognized the government, competition and customers as most important stakeholders. Interviewees related directly to CRE did not distinguish a specific stakeholder but acknowledge the multiplicity of involved stakeholders which is also visible in document regarding the stakeholder management

(document 8). The document enumerates all the internal stakeholders (employees, facility managers, HQ team, manager directors and work council) and external (customers, competitors, government, local community, neighbours and the public) . This aligns with literature findings on multi-actor process in sustainable change (Köhler et al., 2019; Manning&Roulac, 2001; Gladwin et al., 1995; Elzen&Wieczorek, 2019). Despite the professional focus of the interviewees most of them mentioned the importance of the CEO and the executive board.

| Source of information: interviewees | Internal stakeholders | External stakeholders |
|---|---|---|
| **Management** | Executive board, CEO, employees, shareholders | EU, the government, customers, investors |
| **Managing directors of plants** | Executive board, CEO, management, employees, the society | EU, the society |
| **CRE** | Executive board, employees, shareholders, CEO | Customers, competitors, EU |
| **Facility management** | Employees, executive board, facility management | Competitors, customers, suppliers |

Table 7. Importance of internal and external stakeholders according to different employees. Own work.

### 4.2.2 Financial incentives

In the interviews, the financial drivers are not explicitly identified as the most significant factor. However, the importance of investment evaluation is frequently mentioned. There is a considerable focus on return on investment. Sustainable investments are evaluated in the same way as any other type of investment, with a preference for a quicker return. "It's always important in the end that it should pay out. If I take the solar panels as an example: this was calculated really hard" (Interviewee 15) or "a company tries to be as economical as possible and also tries to keep an eye on the costs" (Interviewee 1). Document 5 confirms this attitude as it outlines a comprehensive action plan focused exclusively on the evaluation of sustainable investments. Each proposed investment, such as photovoltaic system, is evaluated according to the amortization calculation. Also they are evaluated on the investment costs and potential savings. The priority of each project is assessed on a scale from 1 to 3. Based on this data final decision can be made. This aligns with what is stated by Ferraro et al. (2005) about the economics language being dominant in the discussion. Also it was mentioned that “primarily [...] sustainability is always a financial burden" (Interviewee 1). Another financial dimension recognized was the financial savings due to sustainable measures: “Of course it is a financial cost savings [implementing PV]" (Interviewee 2). Nevertheless, the high initial costs often overcome the future savings. These findings provide partial confirmation of a finding reported by Hanzhang et al. (2023) that cost and energy savings are drivers of sustainability. It was mentioned by the interviewees that

the sustainable investments have to fit in the budget as there is no separate budget for that and that often it is a matter of prioritisation: “They're definitely 100% aware of it [of sustainability]. And treat it seriously I think. Prioritizing is the biggest issue right now, cause so many topics dealing with sustainability are not among the high priority topics" (Interviewee 8). The non-financial report (document 1) also confirms the need for quantification mentioned in the interviews and the prevalence of financial language in business mentioned by Ferraro et al. (2005): “This overarching dialogue [between management and local facility management] ensures that the potential savings identified can also be examined at other locations and implemented if necessary. Centralised data management additionally promotes this” (document 1). It can be argued that quantitative data remains the most prevalent tool employed in business communication. Although not explicitly stated, the responses from interviewees and the documents confirm that financial incentives are often seen as the main driver (Van der Byl & Slawinski, 2015). It is visible that the economic language and logic is prevalent also for sustainability. Sustainable investments fall under the same criteria as other investments and thus they have to pay off to be taken under consideration. Since all of the production sites are owned by the company and the company does not use external financing for their real estate investments the drivers related to external financing were not recognized. The interviewees focused on the internal financial aspects such as investments costs and savings. Prioritisation, especially of investments, was often mentioned in relation to sustainable actions. If there were more pressing issues, they would have the highest priority. The economic situation and the evaluation of investments play an important role. “But whenever one person says no, it’s actually too costly, then sustainability has a very low priority” (Interviewee 3) or “I think everybody has to find its own way how to measure, to prioritise ad get it into because we always have to prioritise our resources. We don’t have infinite resources” (Interviewee 10) and “it’s a hard challenge actually which investments we are actually prioritizing [...]” (Interviewee 15). The document on the action plan (document 5) confirms the valuation of different investments, with the financial criteria being the most important factor. Prioritization is also evident in literature regarding the paradox in corporate sustainability through the conflicting values and organisations having to meet divergent demands (Smith & Lewis, 2011).

### 4.2.3 Regulatory drivers

As already mentioned in the subchapter on stakeholders the EU and the government play an important role in implementing sustainable measures. As a stock-listed company WN is obliged to adhere to the upcoming CSRD and national regulations regarding CO2 emissions. The regulations also encourage them to take further steps to ensure market competitiveness. Here, the division of roles and responsibilities is clearly visible as the role of EU, and specifically the CSRD, was recognized only by the management level: "CSRD forced us to get more focus on the non-financial risks"

(Interviewee 9). The facility managers are not familiar with these regulations and emphasize the division of roles in that regard. What they deal with directly are the two ISO standards: 14001 and 50001 related to environmental management and energy management: "And if you don't have this certificate [ISO] you are not able to beat [competition] or to go on the market. So that's also a big important point" (Interviewee 9). Overall the regulations are seen as a key driver as they are obligatory and enforce the corporations to act: “I think the drivers through regulations are more powerful at the moment because you have to and it's required by the auditors" (Interviewee 14) and "the rear driver is 80% regulation and 20% is employees and customers" (Interviewee 13). Nevertheless, they are very complex and real estate is only a small part of it: "real estate is never the real focus. I mean there is a lot of questions with energy and stuff you need to report but compared to other topics it's not that much" (Interviewee 4). The potential of regulatory instruments in facilitating a sustainable transition was also highlighted by Köhler et al. (2019) and Ozanne et al. (2016).

The documents make reference to regulatory drivers, indicating that employees should abide to them and that they are an important part of corporate management. More focus is put on ISO standards, which are evaluated in a separate document (document 9). This document describes what kind of measures will be implemented in the upcoming year, then describes how much energy was used, how much emission produced and a quantitative goal is set to improve key figures by 5%. The document focuses in general on environmental and energy aspects related to ISO 14001 and ISO 50001 without specifying real estate.

### 4.2.4 Climate change risk management

The final area of focus in the interviews was the recognition and management of risks associated with climate change. The health and safety of employees at production sites is generally well developed, with appropriate policies and procedures in place. This is significant because 57% of WN’s employees are engaged in production activities. Most of the interviewees claimed that risks related to climate change are not being addressed yet. This reflects the evolving nature of the concept as it was identified in the literature review. Whether those risks are assessed was dependent on the role of the employees. The employees involved on the management level were aware of the risks and mentioned first steps taken in assessment of the risks: “We definitely think about it [risks related to climate change]” (Interviewee 8). Going towards the operational level it was mentioned that: “we don’t see any direct risks from environmental influences here at the site” (Interviewee 1) or “[risks related to climate change] it's not under consideration, we did not project what the temperature will be in 10 years from now in order to specify that into the building” (Interviewee 15). What was frequently mentioned though was the risk affecting the client base, especially clients for agricultural equipment: “it's more in the thinking from our customer basis because the farmer will be the first guy who is suffering if there are climate changes” (Interviewee 2) and “but if

you look a little bit more in detail it will affect our customers base [the climate change]" (Interviewee 12). However, there is a lack of recognition of the climate change risks that affect real estate and, consequently, the safety and comfort of employees. Rötmmer et al. (2022) highlight the impact of climate change on employee safety, yet this was not identified in the interviews.

In the documents it was found out that the EU Taxonomy enforced the company to start assessing the risks related to climate change (document 4). This assessment was started with chosen 20 locations. It is focusing on four main aspects: temperature, wind, water and soil. Each risk is evaluated thoroughly. The results of the assessment are shown on a three-tier scale: low risk, medium risk and high risk. The climate risk and vulnerability assessment was published in 2023. Document 1 evaluates on the risk assessment stating that "no significant net risks from the Group's perspective". Beyond that the climate risk assessment was not recognized throughout the documents.

Interviewees also raised the issue of quantifying non-financial risks. Respondents stated that the quantitative logic used for financial risks should be applied to non-financial risks in the future. The documents (document 1, document 5, document 6, document 9) confirm the importance of quantification in the assessment and evaluation of sustainability. This is particularly evident in the context of ISO standards and the necessity to gather specific data in order to evaluate the standard. This need for quantification of risks was mentioned by Ferraro et al. (2005). Organisations put emphasis on financial benefits and economics aspects also within risk management. It is perceived as one of the biggest challenges: "in risk analysis we have to bring everything back to a quantifiable risk to understand what is more important" (Interviewee 10) and "right now I would not have a clue how to produce KPIs [...] that links directly to climate changes" (Interviewee 11). The quantifiable logic was recognized in the literature as well. Social and sustainable goals are more subjective, which makes them more difficult to measure (Ozanne et al., 2016) and thus makes it difficult for organisations to include those in the traditional, financial risk management scheme. In their research on relations between performance measurement systems and sustainability reporting Speziale and Klovienė (2014) share that the two when integrated can potentially have a positive effect on the achievement of corporate objectives. Also they suggest that to achieve sustainable performance organisations need to translate overall sustainable strategy into each area, which is currently being developed within WN.

### 4.2.5 Emergent topics

Throughout the interviews and documents various topics emerged, which were not included in the research framework and interview protocols. The emergent topics were not necessarily drivers but were considered important in the sustainability change. The most frequent emerging topics were sorted and are explained below:

Local communities

The local communities were identified as a significant factor, with several different forms of involvement being proposed. The term “communities” is used here to refer to the municipality and the local residents and neighbouring companies. Firstly, local communities in Germany play a role in the assessment of new investments and developments. The degree of involvement varies from one federal state to another. Some communities require companies to implement sustainable measurements such as PV systems. Korbach site is a member of a local association, which revolves around sustainability. It is an association where local enterprises share knowledge and learn from one another. As was mentioned by one of the interviewees: “the small ones [other companies] have very, very good simple ideas to reduce emissions” (Interviewee 2) and thus the larger companies can learn from them. The involvement of local communities is also noticed in power-interest stakeholder matrix (document 8).

Communication and transparency

The importance of communication and transparency was highlighted by interviewees, who stressed the need for the implementation of sustainable measures and the transparent reporting of the group's sustainability. It is crucial for effective communication with clients and the public. Internal communication is based on coordination meetings between the central energy department and local site contacts (document 1). Transparency means informing the public about sustainable development and thus improving the company's image: “It's also a bit of an image - of course we don't want to be seen as the environmental polluters in the district” (Interviewee 1) and “We have these reports, the annual reports, and there is explained what we are doing” (Interviewee 3). The non-financial reports (document 1) are published annually and serve to illustrate the company’s sustainable approach. Furthermore, the company's website page also places significant emphasis on sustainability. Transparency is also mentioned in relation to sharing the emission goals: “trying to reach our CO2 goals, we have a clear statement as well, what are our emission goals for this year and for the next year” (Interviewee 12) and “it’s very important to communicate transparently [...] on what is happening in the facility management” (Interviewee 5). This topic has also been recognized by Ristaniemi and Lindholm (2011) in their model for added value in industrial premises (figure 4). One of the elements on the corporate level is promoting company brand. Another element is embracing sustainability. Ristaniemi and Lindholm did not distinguish the relation between those two elements but this relation was apparent in the interviews.

Energy security

Safety was also often associated with sustainability, mostly in two dimensions: human health and safety as well as energy security. The importance of energy security grew particularly after the Russian invasion on Ukraine in February 2022. Implementing

sustainable measures such as photovoltaic systems and becoming independent of gas were mentioned in interviews. This driver was not present in the literature. The influence of the geopolitical situation is very specific to place and time. The specific situation related to the Russian aggression on Ukraine in 2022 influenced the responses, but it should not be generalised and should be further researched.

Time

The aspect of time was mentioned in two dimensions: implementing short term versus long term solutions and through active or reactive attitude. The interviewees were aware of the importance of long term and active implementation but emphasized the difficulty of such management behaviour. It was admitted that for now most changes are driven by negative incentives: “because we are always driven by pain, something must happen before we react" (Interviewee 9). The PV installation in one of the sites was a reaction to the mentioned above Russian invasion: ”It was a reaction right here” (Interviewee 9). The approach is also affected by the standards which are set by the financial standards, for example in the case of climate risks management: “the financial risk management database [...] has only one year time horizon” (Interviewee 7) and thus long term climate risks are not included there. Sustainable investments are long term investments and this is mentioned as a barrier to such investments: “it’s always a long term investment, unfortunately, and that’s why it’s such a difficult topic” (Interviewee 8). The fact that it is a long term process is confirmed by Köhler et al. (2019) but tensions between short and long term orientations around corporate sustainability can be a barrier (Slawinski & Bansal, 2015). Economic short-termism is apparent in the managerial attitude and focuses on short term at the expense of long term (Slawinski & Bansal, 2015). Another barrier to long term investments can be technology: “long term strategies are not always possible because the technology to implement such changes is not there yet” (Interviewee 14). Lozano and Huisingh (2011) in their research based on Elkington’s triple bottom line have found out that all three dimensions should be addressed on the long-term horizons. “Efforts focused solely on efforts designed to ‘solve’ problems on short-term, unilateral, or compartmentalised approaches have created the current crises, and can lead to catastrophes [...]” (Lozano & Huisingh, 2011). As they mention the dominant socio-economic paradigm tends to focus solely on short-term profitability, which does not support sustainable growth.

## 4.3 Key takeaways

| No. | Theme | Description | Existing body of knowledge | Research question |
|---|---|---|---|---|
| **1** | Stakeholders | Important role of executive board | Smith et al. (2015)<br>Manning & Roulac (2001)<br>Miras et al. (2015) | 1 |
| **2** | Stakeholders | Important role of the CEO | Smith et al (2015)<br>Manning & Roulac (2001)<br>Miras et al. (2015) | 1 |
| **3** | Stakeholders | Employees | Kim et al. (2016) | 1 |
| **4** | Stakeholders | Customers, competition and society | Manning & Roulac (2001) | 1 |
| **5** | Stakeholders | EU as a stakeholder | - | 1 |
| **6** | Stakeholders | Multiplicity of stakeholders | Köhler et al. (2019)<br>Manning & Roulac (2001)<br>Gladwin et al. (1995)<br>Elzen&Wieczorek (2019) | 1 |
| **7** | Financial | Investment evaluation | - | 2 |
| **8** | Financial | Prevalent financial language | Ferraro et al. (2005) | 2 |
| **9** | Financial | High initial costs | Hanzhang et al. (2023) | 2 |
| **10** | Financial | Often seen as main driver | Van der Byl & Slawinski (2015) | 2 |
| **11** | Financial | Prioritisation of investments | Smith & Lewis (2011) | 2 |
| **12** | Regulatory | Regulations as the most important driver | Köhler et al. (2019)<br>Ozanne et al. (2016) | 3 |
| **13** | Regulatory | EU as an important stakeholder | Köhler et al. (2019)<br>Ozanne et al. (2016) | 3 |
| **14** | Climate risk management | Double materiality is not yet well-recognized | - | 4 |
| **15** | Climate risk management | Need for quantification of risks | Ferraro et al. (2005) | 4 |
| **16** | Climate risk management | Employer health and safety is already well recognized | Rötmmer et al. (2022) | 4 |
| **17** | Climate risk management | Quantification of risks | Ferraro et al. (2005)<br>Ozanne et al. (2016)<br>Speziale & Kloviene (2014) | 4 |
| **Emerging topics** | | | | |
| **18** | Community | Influence of local communities | - | - |
| **19** | Communication and transparency | Transparency of corporate actions | - | - |
| **20** | Security | Recognizing sustainability as an opportunity for energy safety | - | - |
| **21** | Time | Long time investments and reaction over action | Köhler et al. (2019)<br>Van der Byl & Slawinski (2015)<br>Lozano & Huisingh (2011)<br>Slawinski & Bansal (2015) | - |

Table 8. Summary of key research and literature findings with relation to the research questions. Own work.

The general themes outlined in the literature on sustainable transitions were recognised throughout the interviews. Looking in more detail, the specific roles and responsibilities of employees were not recognised in the literature, but were identified as an important factor in the interviews. Employees focus on different aspects of sustainability and notice different drivers, the difference are most apparent between the facility managers and the top management level. Employees with same roles but related to different locations have similar views and ambitions. The matrix character of the organisation is an important aspect in sustainability implementation. Not all of the emerging topics have been recognized in the literature. That is especially true for the most current topics such as the Russian aggression on Ukraine, which has impact on energy stability in Europe and corporations recognize chances for energy security within the sustainable solutions. It was recognised that the sustainable development strategy of the WN Group in general, including real estate, is an ongoing issue. Most of the documents have been published recently and employees are involved in the recently launched CSRD initiative. The same applies to the literature. The most relevant sources of literature and market research have been published recently, i.e. in 2022 or 2023. In addition, the European Commission is currently publishing new documents and reports on CSRD. It is clear that the topic is developing rapidly and should be followed closely in order to compare the results with the most recent position of the literature and regulatory bodies. Nevertheless, as mentioned there is lack of literature on industrial real estate and industrial real estate owned by companies which is not being researched. The specificity of the industrial sector is also worth mentioning.

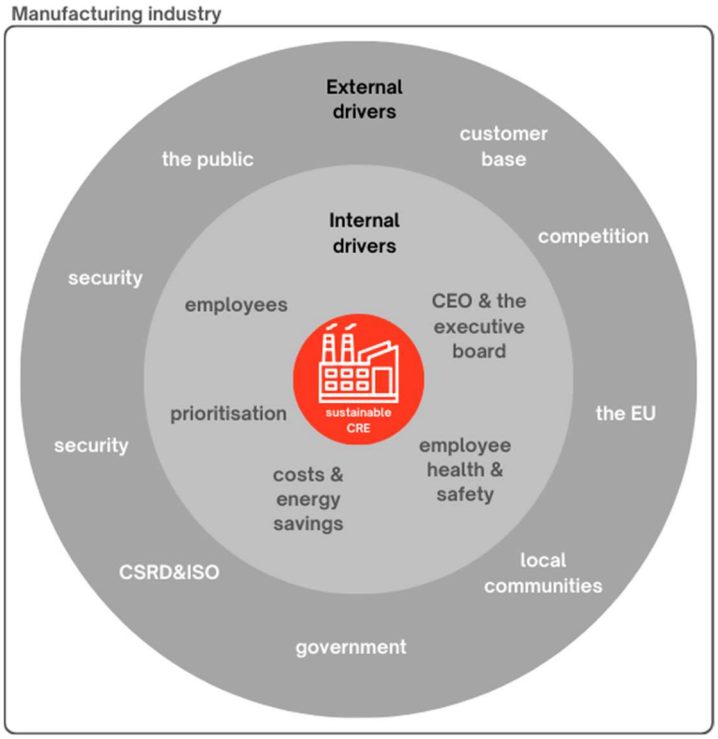


Figure 20. Key findings: internal and external drivers for sustainability change of CRE of a manufacturing company. Own work.

The industrial sector is very specific as it is not in the spotlight but is a crucial part of the economy. The manufacturing industry, particularly within construction equipment, is dominated by male stakeholders and customers whose primary interest may not be in sustainable growth. Women involved at the managerial level pointed out that the character of the industry can be an obstacle and that involvement of women could speed up the pace of change. Studies show that firms with a diversified leadership teams are more effective than others at sustainable strategies (Glass et al., 2015). A report by the European Investment Fund shows that women-led companies have higher environmental, social and governance scores, and that companies with more women in senior positions have a better track record of adopting green practices (Pavlova & Gvetadze, 2023). The women's impact on sustainability is recognized in literature but at the same time it is noticed that there is not enough women in charge to drive this change. The findings prove the complexity of sustainable management which is recognized in literature on paradox perspective in sustainability (Ozanne et al., 2016; Hahn et al, 2018; Van der Byl & Slawinski, 2015). In addition to the most important stakeholder influence, understanding the context in which the given CRE is set is critical to the implementation of sustainability.

### 4.3.1 Drivers of sustainability in owner-occupied real estate versus commercial real estate

As mentioned throughout this paper industrial real estate is a distinctive type of RE, which is usually owner-occupied. It is quite different from commercial real estate such as office or retail real estate, mostly owned by investors. As described by CoreNet (2015) CRE plays a supporting role for the business. Research on CRE focuses on added value and alignment of CRE with the main business whereas research on commercial real estate often focuses on the financial side related to lease agreements, green financing and tenant perspective (Brooks & McArthur, 2020; Eicholtz et al., 2010; Warren-Meyers, 2012). The perspective is quite different when the real estate is the main business in comparison to the supporting role of manufacturing sites. The perspective is also different when it comes to sustainability reporting. Sustainability reporting obliges organisations to report on their business actions. In the case of a business that is primarily engaged in real estate, the focus would be on the real estate assets, as this primary asset generates data for the given company. In contrast, in the case of CRE and other businesses such as the production sector, real estate has only some influence on the environment in comparison to the business as a whole. Thus the focus within their reports is not spread equally. Nevertheless, there are similarities in sustainability approaches to those found in this research. The first and foremost common driver is energy efficiency and furthermore cost saving. Literature also pointed out importance of hiring highly motivated and dedicated staff in introducing sustainable change which overlaps with the findings of this research. Financial concerns are important in both cases but are equally important to marketing and reputational drivers. Regulatory

drivers were also found important in commercial real estate, together with standards but in the case of commercial real estate standards such as WELL or LEEDS were mentioned, instead of ISO as in the findings of this research. Both perspectives understand sustainability mostly as resource cost minimization, particularly of energy, together with financial viability of sustainable measures. Lastly it was noticed that both in commercial as well as corporate real estate competitiveness and advantages coming from being sustainable, against competitors, play an important role. Focus on sustainability is growing in all sectors and recognition of its importance is growing but still in both cases the sustainability focus is predominated by energy efficiency. The sustainability drivers which are specific for commercial real estate are mostly related to tenants and investors. Literature often mentions that tenants put emphasis on the sustainability of the offices that they rent. Other drivers are related to financial aspects such as investors, rent rates and sale prices. There is a direct link between investing in sustainability and higher financial profit. Green leases are also quite often mentioned in literature but its unique for commercial real estate as often owner-occupied real estate, especially in industrial sector are owned by the company and thus no external financing is used. It is also noteworthy that the literature on commercial real estate already recognises the importance of mitigating climate change risks, which relates to double materiality. It was not found in the literature on industrial RE, nor in this Master's research. It is particularly interesting because industrial property is usually a long-term asset, it is not flexible and therefore more vulnerable. Therefore, more emphasis should be placed on risk management in relation to industrial real estate.

### 4.3.2 Further recommendations

After the research, I want to go one step further and look at the actions that the researched company could take to achieve sustainable goals and continue its sustainable growth in the coming years. I also want to give more attention to the importance of policies and regulations, as pointed out by Ozanne et al. (2016). In this study, the impact of policies on sustainable development was recognised. The current policies, such as CSRD, are still under development. In which direction should they go in order to promote sustainability also in industrial real estate? The first step, also mentioned by several consultants in relation to CSRD (South Pole, 2023; Colot, 2023), is the importance of early data collection and assessment of the current situation. These steps are already being taken as a by-product of ongoing regulation. The current assessment is still unregulated and therefore does not allow comparison between different companies or sectors. It is visible for example through the European Energy Performance of Buildings Directive (EPBD). Adoption of the directive has been uneven across European Union member states. Some countries adopted it earlier and are already applying it. Others are introducing it this year. Policies should strive for unification, which would allow for comparison and easier assessment of the current state of the built environment in European Union. The assessment should focus firstly

on quantitative data as most companies already work with particular data, for example energy use of buildings. Secondly, more focus should be put on qualitative assessment. Qualitative data is more difficult to compare so certain standards of assessment should be settled. A review of the literature and of current practice reveals that the environmental aspects are typically included on the corporate agenda, whereas the social aspects are frequently absent. It is mostly due to the quantification issues. Environmental aspects are easier to quantify and thus easier to compare. This emphasis on social aspects should also be visible in the policies. The research findings indicate that policies play a significant role and are widely recognised as an important driver, given that they are typically obligatory. It is recommended that the role of policies should extend beyond the environmental aspects, with greater emphasis placed on the social aspects. Furthermore, policies should popularise the concept of double materiality and encourage the integration of climate risk management into corporate strategies. It is recommended that policies should encourage a holistic approach to sustainability through the triple bottom line. In addition, it is important to start assessing and collecting data early to be prepared for ongoing European regulations. Regulations are constantly changing and it would be advisable to adopt a strategy to anticipate the ongoing changes and address the upcoming requirements.

Wacker Neuson SE and its production premises should aim to minimize and optimise energy use as well as provide safe working environment for the employees, which takes into account risks related to climate change. First of all they should continue with their developed sustainable strategies but should further educate and explore the topic. More emphasis should be put on all parts of the business, from product, through production and supply chain, to real estate assets. They should continue with the ongoing data gather on energy usage on the production sites and the ongoing implementation of measures to minimize the energy use. Beyond that they should look at the sustainability change of their real estate holistically. It already focuses mostly on environmental part, partially on financial sustainability but to a lesser extent on social sustainability. It was noticed that social sustainability overlaps with health and safety measures. It would be recommended to enhance social sustainability through already implemented health and safety standards. In order to guarantee social sustainability, it is essential to place a greater focus on the management of risks associated with climate change. At present, risk management is primarily linked to financial risk management. By placing greater emphasis on the assessment of risks related to climate change, it will be possible to prepare for potential hazards resulting from climate change.

# 05
# Conclusion

# 5 Conclusion

## 5.1 Who are the most important stakeholders driving the sustainable change in corporate real estate management?

The most important stakeholders recognized by the employees of the manufacturing company are: the CEO and the executive board, the employees, the customers and the competitions as well as the EU and the government. Depending on the interviewee different emphasis was put on internal and external stakeholders. It is evident that stakeholders represent a key driver of change, yet the multitude of these stakeholders presents a significant challenge to the implementation of sustainability initiatives.

## 5.2 What are the financial reasons for sustainable implementation in industrial corporate real estate management?

Financial aspects were identified as a barrier to progress rather than a driver. The language of finance is prevalent in the context of sustainable investments, which are assessed and evaluated as quantifiable goals. Consequently, these investments must demonstrate a return on investment in the same way as any other investment. Prioritisation of investments is clearly visible. Sustainable solutions can lead to energy savings and thus to financial savings but this is not regarded as the most significant driver.

## 5.3 What is the role of European and national regulations in sustainability implementation in industrial corporate real estate management?

Regulations are recognized as a very important driver. That is especially visible among the managerial positions. The most important regulation is the recent European directive on corporate sustainability reporting. Employees on operational level recognize the ISO standards for energy and environment as regulations driving the sustainable actions the most but they are not familiar with European regulations. The EU is also recognized as an important stakeholder.

## 5.4 Is double materiality taken into account in the aspect of climate change risk management?

Double materiality is not recognized among employees, except for top management positions. There is little correlation between climate change risk management and employee health and safety. Among the operational positions the solutions to climate change risks are implemented but as a result of health and safety assessment, not the other way around. Among the top management positions climate risk management is closely correlated with EU Taxonomy and European regulations imposing climate risks assessment onto corporations. The challenge of quantification of risks related to

climate change is an important obstacle in risk management, which is dominated by the financial language.

## 5.5 What are the external and internal drivers of sustainability in corporate real estate management of a manufacturing company?

The most significant sustainability drivers in the field of corporate real estate management within a manufacturing company are stakeholders, with a particular focus on internal stakeholders, including those at the top management level, as well as external stakeholders such as the European Union and its regulations. It is also acknowledged that external regulations represent an important driver, as does the internal financial evaluation of sustainable investments. The current geopolitical situation also influences the factors that drive the transition to sustainability. The aforementioned drivers are, in general, quite dispersed and numerous. The difficulty of quantifying environmental and social goals was identified as a significant obstacle to sustainable change. Nevertheless, the emphasis on sustainability in industrial real estate is also evident, despite the supporting role, as it reinforces the sustainable image of the company overall.

# 6 Limitations and recommendations

## 6.1 Limitations

- The main limitation is the single case study and limited sample. The case study was conducted at a single organisation – Wacker Neuson. Single case study does not allow for generalisation of the results which applicability might be limited to the specific company profile. The localization of the company and thus the specific geopolitical context is also an important limitation of this research.
- It was not possible to reach all the valuable interviewees – although most of them were accessible. Also as seen in table 4 most interviewees were related to corporate strategy and management. There is a visible disproportion between this group and the CRE employees group, which is a small department. This disproportion can be perceived as a limitation.
- Misunderstanding of the topic and miscommunication because of the phrasing of the questions during interviews.
- Limited time to conduct the literature review and the case study.
- Limited publications on the topic of industrial real estate and supporting role of corporate real estate in the context of sustainability making it more difficult to conduct the research.

## 6.2 Recommendations

- The first and foremost recommendation is that more research should be done on industrial corporate real estate which is not owned by real estate developers or investors. Further research could also be done within various geopolitical contexts.
- Further study should be done on sustainable development within corporate real estate management. There is lack of the topic at companies whose main business is not real estate or facility management.
- Further research could be expanded and done within multiple various companies. The compared results could allow for some generalization.
- The results showed the importance of the regulations. Further research could focus particularly on regulations and its direct impact on sustainable solutions implemented within the real estate.
- This research was also focused on the EU context. A further research could focus on influence of regulations in a broader context.

# 7 Reflection

This thesis is part of the Management in the Built Environment track at the Faculty of Architecture at TU Delft. The aim of this thesis is to add to the existing body of knowledge on sustainable development in corporate real estate management, especially in the industrial context.

Relevance

During my studies I developed an interest in Corporate Real Estate Management. Thanks to the Real Estate Management course in the MBE track, I became familiar with the theory of CREM and through this master thesis I wanted to explore the topic further and deepen my interest. From the start of the research process, it was clear that there was a gap in the research on corporate real estate owned by companies. Most of the literature focuses on RE developers and investors whose main business is RE. All the regulations then have a direct impact on their property management strategies. A research gap was also identified in the search for sustainability in the context of industrial buildings. Most of the literature focuses on production processes or revolves around property owners such as logistics centres, etc. The research is therefore relevant to highlight the lack of literature on the subject and to draw attention to the 'grey' part of industrial real estate owned by manufacturers. Such companies are already implementing sustainable solutions not only in their main products but also in their real estate, and this thesis draws attention to the driving factors for sustainable change beyond the environmental dimension.

Method

The chosen method was successful, but was reviewed during the process. The first step of preparation provided the background for further work and revealed the significant research gap. The research gap also made it difficult to establish a clear theoretical background to refer to. The initial literature review provided inspiration for the theoretical framework. After the research was carried out, the theoretical background had to be reviewed as it was found to be insufficient to support the findings. Thus, in the end, the research used both inductive and deductive logic, although the initial assumption was to follow only inductive logic. It was an obstacle during the research process to allow more flexibility within the research methods. The limitations of the case study method are mentioned in the previous chapter. The open interview method was successful because it allowed for flexibility and adaptation of topics depending on the interviewee. The questions and the approach were adapted according to the role of the interviewee. The topics discussed during the interviews were related to the theoretical framework, but also included topics outside of the framework in order to get a complete picture of the attitude and understanding of the topic. The single case study limits the transferability of this research. As suggested in the previous chapter, further research

should focus on multiple organisations within the same industry but the findings suggest issues that should be explored further and directions that further research could take.

Process

The research process has begun in September 2023 and is planned to be finished in June 2024. Throughout this process I have been supported by my main mentor Hermann vande Putte, my second mentor Michaël Peeters and company mentor Matthias Obst. The first few months were difficult because of the amount of literature, topics and possibilities. Narrowing down the topic was a challenge. The first few months of feedback were both helpful and confusing. But as time went on and my understanding of the different topics grew, the path became clearer and so did the feedback. The process of learning to communicate properly was very important and influenced the quality of my work. The last period, between P3 and P4, was the most satisfying as the work became more coherent.

Final part of graduation

For the final part of my graduation (P5 period), I focused on re-evaluating the results of the research. This means re-reading the work, re-evaluating the validity of the conclusions and focusing on creating a coherent story. I also focused on the final formatting of my work. The final part of my research also included a trip to two production sites (Pfullendorf and Hörsching) between 4 and 6 June. These visits helped me to better understand what I had written about and to improve my narrative during the P5 presentation.

Personal reflection

I am very glad with the process of completing the degree. It was challenging, especially the part of literature research and setting boundaries for literature research. The topic is an ongoing topic that is currently present in media and corporate reports, which makes it even more interesting to work on. Another thing that makes this research so interesting is the lack of literature on these topics. As mentioned before, this is also an obstacle and a challenge. But at the same time it encouraged me to do this research and to focus on the topic of corporate industrial property. The most difficult point in the research was just before P3, right after data was collected. The results were clear, but not in line with what I had read before. What I had read gave me a background, but it could not be directly applied as a theoretical background. It was an important moment for a change of attitude. The theoretical background was reviewed and approached differently. Then came the data analysis to create a whole story on the topic. The most enjoyable parts of the research were the interviews and discussions with the employees. I also enjoyed learning a lot about CSRD and European regulations, which I was able to discuss during various meetings and conversations with tutors, colleagues and family. The fact that the

topic is still ongoing made the research even more rewarding as I feel I have learnt a lot and gained a lot of useful market knowledge. Last but not least, the process has boosted my confidence.

# 8 Post scriptum

## 8.1 Postscript on floods in Southern Germany in June 2024

From June 1st to June 3rd 2024 two storms led to severe rainfall and flooding in Southern Germany. The heavy rainfalls led to floods which caused five deaths, thousands of evacuations, land-slides and other damages. According to ClimaMeter there is a relation between rising average temperatures and rising precipitation. “We interpret these floods as an event whose characteristics can be ascribed to human driven climate change” (ClimaMeter, 2024). From Figure 21 it can be seen that the change in precipitation is significant in Augsburg, which is one of the areas most affected by the June floods.

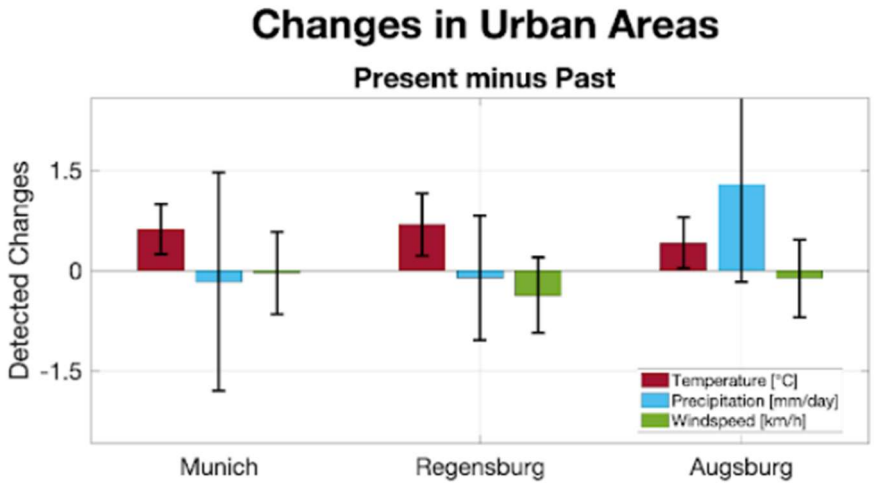


Figure 21. Changes in precipitstion in Urban Areas in southern Germany. Source: climameter.org (2024)

The floods also affected Wacker Neuson's production facility in Reichertshofen, Bavaria. The plant was closed for a week as a result. The water mainly affected the administration building, not the production area, but the entire site was affected by the power shortage caused by the floods. Power was restored around 7 June. Employees were busy restoring the damaged parts of the building to get the site up and running as quickly as possible.

Figure 22. Flooded production site in Reichertshofen. Source: Wacker Neuson's internal resources.

The incident is very much related to the risks associated with climate change, which was part of this master's thesis. The precipitation levels were significantly higher than anticipated. The company was not prepared for this and only reacted to the consequences of these events afterwards. Last year, a climate-related risk assessment was carried out by an external consultant and all sites in Germany were classified as low risk. It appears that not enough attention is being paid to the more frequent weather events that can be damaging even within Germany. The research found that not enough emphasis and attention is being given to climate change risk management. Few employees were familiar with the concept of double materiality. However, it is clear that the climate and more severe weather conditions are affecting WN more than expected. Climate-related risk management should be on WN's agenda and should be taken more seriously, as the consequences of upcoming weather events may become more severe in the future.

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# 10 Appendix

## 10.1 Interview protocol and contact summary sheet

### Interview protocol

**Interview structure**
In the interview the following four topics will be addressed

1) stakeholders
2) financial aspects
3) regulatory aspects
3) climate change risk management

This is a semi-structured interview. The questions and attitude depends on the interviewee, his knowledge in the given topic and role at the company.

Introduction is a fixed element of each interview.

*Introduction:*
*Hello. Thank you very much for joining me for this interview. Before we start I would just like to ask whether it is okay if I record this meeting. I only need the recording for the transcript purposes and will be destroyed afterwards. I have already sent you the informed consent form and would like to ask you to sign it and send it back to me, please.*

*My name is Marta Pietraszewska. I study and work for WN in the Netherlands where I am doing my master thesis research on sustainability in real estate strategies. I chose to focus on WN because I found that the literature focuses on sustainability and ESG in regard to real estate as the main business. I wanted to find out more about this topic at a manufacturing company, how this issue is addressed in such case.*

*First I would like to ask you to shortly introduce yourself and explain to me what is your role at WN.*

After the introduction follow the questions related to the four topics mentioned above. During the interview I am taking notes in a contact summary sheet which can be seen on the next page.

## Contact summary sheet

*Before the interview*

**Name:** **Date of interview:**

**Function:**

**Plant (if applicable):**

*During and after the interview*

What were the main issues or themes that struck you in this interview?

| Question/theme | Notes/recurring themes |
|---|---|
| | |
| | |
| | |
| | |

What new questions do you have in considering the next interview?

Codes:

## 10.2 Document summary sheet

Document summary sheet

**Name of the document:** **Source:**

**Importance of the document:** **Date of publishing:**

**Brief summary of content:**

## 10.3 Informed consent letter template

Delft, 21 June 2024

Dear sir/madam,

This (online) interview is part of master graduation research done by Marta Pietraszewska. The research is conducted within the track Management in the Built Environment at the Faculty of Architecture at the Delft University of Technology. The research focuses on the impact of ESG on real estate strategy, focusing particularly on manufacturing industry. Wacker Neuson was chosen to be part of the case study method. The case study method involves conducting interviews with various stakeholders who are somehow related to real estate or sustainability strategies at Wacker Neuson. The research is supported by two mentors from TU Delft: Herman vande Putte and Michael Peeters and a mentor from Wacker Neuson: Matthias Obst.

You are not obligated to participate in this research. You are always able to withdraw your participation in the research and ask for your data to be destroyed without giving a reason. You may also refuse to answer questions that is put forth.

I hereby declare that I will handle your details with care and that said details are stored in a protected European server. The document used to track the code assigned to your details is password-protected and stored in another location. This key document will be destroyed 5 years after the final scientific publication of this research.

If you have questions about this research, you can contact:

Marta Pietraszewska

If you are participating in this research, please fill in and sign the consent form.

Yours sincerely,

Marta Pietraszewska

| | Yes | No |
|---|---|---|
| (1) I hereby state that I have read the information letter of 21 June 2024 or have had this letter read to me. I have understood this information. I have received the opportunity to ask questions and these questions received satisfactory answers. | ☐ | ☐ |
| (2) I hereby state that I am voluntarily participating in this research. I understand that I may refuse to answer questions and that I may stop my cooperation with this research at any given time without giving any reason. I understand that participating in this research means that the answers to the questions will be saved. | ☐ | ☐ |
| (3) I understand that the audio recording (or an edited version) and the other data will be exclusively used for analysis and scientific presentations and publications. | ☐ | ☐ |
| (4) I understand that the data will be saved under a code and processed anonymously. | ☐ | ☐ |

**I have read this form or have had this form read to me and I agree to participate in this research.**

Place: Date:

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ (Full name, in capital letters)

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ (Signature Interviewee)

'I have provided an explanation of the research project. I declare I am willing to answer questions that arise regarding the research to the best of our abilities.'

Marta Pietraszewska