MASTER

The process of implementing and reporting of sustainability in Corporate Real Estate Management

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Master thesis

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Colophon

Preface

During my real estate management and development study, my curiosity towards corporate real estate management grew, as it was an undervalued and fairly unknown profession. Besides this growing curiosity, my interest in the sustainability performance of the real estate market jump-started during my internship at a company in Amsterdam, called GRESB. GRESB made me realize how sustainability can change the market in a positive way and how sustainability should be implemented in the real estate portfolio, not only for environmental purposes.

The provided information during the lecture of Rianne Appel-Meulenbroek about the combination between corporate real estate management and sustainability was relatively limited in my opinion. As the awareness of the impact of climate change on our daily lives is getting more noticeable in the news, I became aware of the importance of doing research in the topic of corporate real estate sustainability management.

I could not have written this master thesis without the support of my supervisors at the University of Technology in Eindhoven and GRESB B.V. I would like to thank Theo Arentze, Rianne Appel-Meulenbroek and Elsbeth Quispel for their valuable advice and especially the encouragements when I needed it during this intensive period. In addition, I would like to thank the corporate real estate managers who took their time to participate in the interviews in which they shared valuable information about their organizations. Finally, I would like to thank my family and friends for their support and patience.

I hope you will enjoy reading this research paper,

Luc van de Boom
Eindhoven, October 2015

Executive summary

When organizations manage and implement sustainability to increase the added value of the organization through their leased or owned corporate real estate, it is called Corporate Real Estate Sustainability Management (CRESM). Corporate real estate sustainability management has been investigated by a limited amount of researchers. However, sustainability as a topic within the real estate literature is emerging as the benefits of sustainability on the core business is becoming more apparent. The definitions of the two topics, Corporate Real Estate Management (CREM) and sustainability were consolidated by the UNEP (2014) in the following definition:

"Corporate Real Estate Sustainability Management (CRESM) refers to the integrated management of all economic, environmental and social aspects of an organisation's property (real estate) activities and associated investment decision-making. It comprises and applies to all relevant strategies, processes and organisational structures that support corporate governance and sustainable business and product development."

This definition teaches us that corporate real estate sustainability management is focused on adding value to the organization by contributing to the overall sustainability performance in the organization. The drivers for organizations to implement sustainability in the CRE portfolio can be separated into external, corporate and building levels. Stakeholders and governmental bodies define and influence the external drivers. The corporate level reflects the advantages for the organization, by improving the image and reputation, engage with employees and increase the productivity and wellbeing of the customers and employees. The implementation of sustainability in the portfolio can reduce the operational costs and therefore increase the value of the buildings.

Although the drivers of sustainability in the CRE portfolio are evident in the existing literature, organizations are often neglecting the profound benefits of these sustainability indicators in the corporate real estate portfolio. Especially the circle of blame causes the real estate market to disregard the value of the implementation and reporting of sustainability indicators in the CRE portfolio and communication to their stakeholders. There are indications in the real estate market that this circle of blame is resolving due to better agreements with the involved stakeholders. This could eventually result in a more positive approach, which is called the virtuous loop of adaptation.

Corporate real estate sustainability indicators

In order to rationalize the process of implementing and reporting the sustainability of the corporate real estate portfolio, existing literature has introduced corporate real estate sustainability indicators. However, the CRE sustainability indicators have not been examined in existing literature to a large extent. Only the research of Masalskyte et al. (2014) examined the sustainability measures used by corporate real estate managers to improve the sustainability performance of the buildings. The identified indicators at the interviewed organizations in Finland, as part of this research, are used as the basis for the CRE sustainability indicators used in the content analysis. The measures, like energy and water management, can be divided in multiple CRE sustainability indicators, which are used in the CSR reports of the organizations. In addition to these measures, some green leases were included in the list of indicators.

Energy management	GHG emissions	Water management
• Energy consumption • Renewable energy • Targets	• GHG emissions • Targets	• Water consumption • Targets

Waste management		
• Amount of waste • Targets	Monitoring and controlling	Building certifications (case study or portfolio level)

Sustainable facility management	Sustainable workplaces	Life cycle assessments

Community engagement	Green leases

Figure 1: CRE sustainability indicators analysed in the content analysis (using the Nvivo software)

The added value of the indicators is different among all indicators and is implemented during different stages of a generic sustainability maturity model for corporate real estate management. When organizations implement sustainability in their CRE portfolio, they can be associated with one of the five stages in the maturity model. The first stage can be achieved by recognizing sustainability and having minimal compliance. The second stage obliges the organization to plan and initiate sustainability in the buildings. When the completion of the sustainable plans needs to be measured, the organization is at the 'measure and manage' step of the sustainability maturity model. When the organization measures their sustainability performance, sustainability should be integrated into specific aspects of corporate real estate management, only then will the sustainability performance improve. Finally, the organization should constantly optimize the performance and innovate with new sustainability measures. When the five stages are achieved, the sustainability performance of the CRE portfolio of the organization is at the highest level. Since the development of the technology in sustainable buildings is very dynamic, even organizations in the final stage need to keep innovating in order to overcome challenges in the future.

Corporate real estate sustainability reporting

As corporate social responsibility is generally higher on the agenda of larger organizations in the world, the focus of the content analysis was on the Fortune 500 global organizations. These organizations have a higher obligation to be transparent about the sustainability performance of their corporate real estate portfolio. Of the 500 organizations, CSR reports of 200 organizations were part of the content analysis. Only 143 of the 200 organizations, published a CSR report on their website. The frequency of the CRE sustainability indicators used in the 143 CSR reports is provided in figure 29. Apart from the more frequently used indicators like energy consumption, GHG emissions, water consumption and waste of the CRE portfolio, many other indicators were used to a

certain extent like the generated onside renewable energy, sustainable supply chain management and community engagement are topics frequently addressed by the organizations.
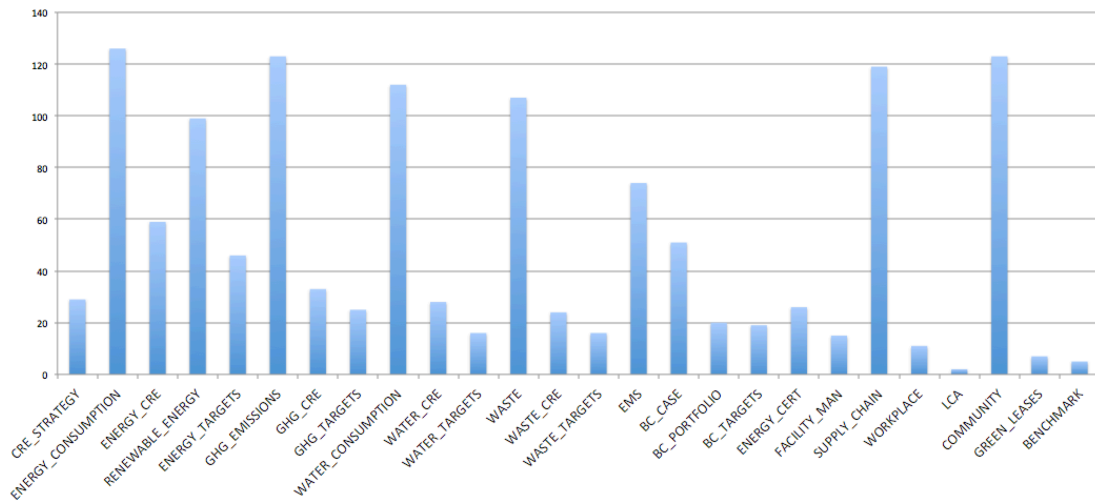

Figure 2: CRE sustainability indicator frequency

As the literature review revealed, the characteristics of the organization could influence the CRE sustainability indicators reported in their reports, because the characteristics influence the corporate real estate occupied by the organization. Data was collected for regional distribution, industry sectors, amount of employees, market capitalization and the ratio property, plant and equipment to the total assets on the balance sheet. The amount of employees has the most positive relations with the CRE sustainability indicators reported in the CSR reports of the target group. When an organization has a higher amount of employees than average, it is more likely that the CSR report describes the corporate real estate strategy, buildings with a green building certificate and how the facilities are managed. The market capitalization is only positively associated with the reporting about the generated renewable energy sources at the buildings. As organizations with a high market capitalization have more resources available, they are apparently focusing more on the relatively expensive renewable energy sources at their buildings.

The regional differences are found when one looks at the North American organizations. These organizations have positive associations with eight of the twenty-one CRE sustainability indicators. Ranked from most likely reported to least likely, these indicators are: building certification targets, energy ratings, building certifications reported on portfolio level, building certification reported on building level, water targets, GHG emissions, water consumption and energy targets for the CRE portfolio. As the regulations to certify are becoming more apparent in North America and in some states even mandatory (EPA, 2013), this trend can be an explanation for the disclosure of building certification indicators in the CSR reports. The European organizations are positively associated with the reporting of the energy targets, environmental management system and facility management. External drivers in the European Union could explain the energy targets set by the organizations included in this research study. Since 2015, it is mandatory to apply for an Energy Performance Certificate (EPC) when commercial real estate is acquired.

The industry sector, in which the organization operates, has influence on which CRE sustainability indicators are reported by the organization. Organizations, which operate in the information, industrials and financial sector, are positively associated with multiple CRE sustainability indicators. Organizations in the industrial sector, for example, are positively associated with communicating energy targets, GHG emissions, GHG targets,

EMS and the building certifications at portfolio level. Organizations in the financial sector are positively associated with the energy consumption and targets, water consumption and building certification portfolio indicators. But a negative association can be found with the reporting on supply chain management. Apparently, the supply chain is less relevant for financial organizations, as their core business is less depended on other organizations.

The topic of the low frequency of reported CRE sustainability indicators in CSR reports was part of the semi-structured interviews. Apparently corporate real estate managers do not decide which CRE sustainability indicators should be included in the annual CSR reports of their organization. The reporting and implementation of sustainability measures is often misaligned, as it does not mean that not reported CRE sustainability indicators, are not implemented within the organization's corporate real estate portfolio. The interviewed corporate real estate managers are often implementing sustainability on an ad-hoc basis; this ad-hoc approach could explain the lack of reporting in the CSR reports.

Although not all interviewed organizations were executing sustainability on a ad hoc basis, it was noticeable in many of the decisions made by the corporate real estate managers. This could mean that corporate real estate sustainability management is currently going through the same stages as CREM did when it was recognized as a valuable resource for the company.

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List of abbreviations

BREEAM   Building Research Establishment's Environmental Assessment method
CRE   Corporate real estate
CREM   Corporate real estate management
CRE portfolio   Refers to all assets, owned or used by a company
CRESM Corporate real estate sustainability management
DMS   Data Management System
EMS   Environmental management system
EPC   Energy Performance Certificate
GRESB Global Real Estate Sustainability Benchmark
GRI   Global Reporting Initiative
GHG   Greenhouse gas
LCA   Life Cycle Assessment
LEED   Leadership in Energy & Environmental Design
PPE   Property, plant and equipment
WGBC   World green building council

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1. Introduction

This chapter describes the introduction to the topic of this research paper. Based on the research topic, the research questions are formulated and explained in further extent. In order to answer these research questions, the research design of this thesis is developed in more detail. In the last paragraph the relevance and a description of the company, GRESB B.V. where the thesis was conducted, is given.

1.1   Subject introduction

Rising water levels, more destructive weather conditions and rising temperatures have become regular news items all over the world. These are a couple of direct and severe consequences of climate change. Therefore, a key global challenge of the twenty-first century is to reduce the impact of humanity on climate change by reducing greenhouse gas emissions produced by humans (United Nations, 2007). Although some of the skeptics still deny that humans are causing the climate change, the vast majority of society is acknowledging the effect of climate change and the greenhouse effect on the day-to-day life. Therefore, the pressure on governments and companies is growing to reduce their ecological footprint and think about the consequences of their core business on the environment. Besides this pressure to reduce the ecological footprint, many organizations come to realize that sustainable efforts are paying off, in both environmental and financial terms (Bonini and Swartz, 2014; Clark et al., 2015).

Governments, especially in western countries, are more and more trying to regulate institutions, like for profit organizations and businesses, to improve their overall efficiency and eventually reduce their greenhouse gas emissions. Besides regulations of the governments, stakeholders of organizations are making more responsible choices when they have to choose between products of organizations (Mohr, Webb, Harris, 2001). This trend is noticeable when you look at the growing interest of customers towards organizations like Tesla, which develops electrical driven cars, and initiatives like 'Filippa K', a sustainable clothing retailer from Sweden.

Before these organizations with sustainable products were thriving, other companies tried to improve the sustainability performance by implementing so called Corporate Social Responsibility strategies and measures. A good example is the announcement of Ikea to invest one billion euros in sustainability in order to become climate neutral (Ikea, 2015). Corporate social responsibility does not have a commonly recognized definition, but it is used by organizations as a way to integrate the economic, social and environmental requirements of their activities into their business operation. Besides doing the right thing for the environment, a corporate social responsibility strategy can have direct benefits for the organization, like a better reputation, higher employee satisfaction and slightly better productivity (Esen, 2013; Feige et al. (2013); Collier and Esteban, 2007; Haynes and Nunnington, 2010). Besides that, investors could be more willing to finance organizations, which are implementing CSR and structure their organization in line with their CSR strategy. Corporate social responsibility has therefore gained grounds as an integrated part of organizations.

This integration of corporate social responsibility can be found throughout organizations, but mostly in departments focused on the core business. Although it makes sense from a business perspective to focus on reducing the impact on the environment of the core products, other resources and business support should be taken into account as well. Notably, the occupied real estate of the organizations can contribute a lot to assist the other resources of the organizations.

1.2   Subject motivation

When you consider that buildings consume 40 percent of the energy used in the world (United nations environment program, 2009) and are responsible for over one third of the world's greenhouse gases (Royal Institute of Chartered Surveyors, RICS, 2005), it becomes clear that there has to be a change in the way we plan, construct, occupy and maintain buildings, if we want to have a more sustainable future and achieve the sustainable development goals of the United Nations (United Nations, 2015). Research shows that the reasons why real estate investors make efforts to be sustainable are rapidly changing. In 2008, the top reason for "going green" was to do the right thing (McGraw-Hill Construction, 2013). In four years time, the reason of the surveyed companies changed to meet the client and market demands (McGraw-Hill Construction, 2013). This change implies that the companies need to change their sustainable behavior to adapt to the demands of their stake- and shareholders (Clark et al., 2015). That is one of the main reasons why many organizations are willing to adapt their organization to an organization with an approach to improve the sustainability performance.

To show the sustainable efforts made by the organization, many of the largest corporations publish annual corporate social responsibility reports to engage with their stakeholders. They use these corporate social responsibility reports to provide an overview of their sustainability efforts and the overall performance and present them in tangible topics. The topics in the CSR reports are often focused on how organizations deal with sustainability in their core business. In the case of Wal-mart, the CSR report focuses on maintaining a high safety level of their food and their efforts to produce sustainable food (Wal-mart, 2014). To structure these reports and to be able to compare the sustainability performance between the organizations, guidelines and standards gained grounds on how to report the sustainability performance of the company in the best possible way, e.g. through the Global Reporting Initiative.

The role of corporate real estate in corporate sustainability strategies and these reporting standards has gained serious grounds during the last decade. Properties are accountable for almost half of the annual energy and greenhouse gas emissions and has become a main focus point for governmental regulations (U.S. Department of Energy, 2003). Since the occupied real estate properties have a huge impact on the GHG emissions of the organization, managers of the real estate department can contribute a lot to reduce the overall emissions of the organization by making sure that their occupied buildings are managed during the whole life cycle with a sustainable approach (Haynes, 2012).

Since the occupied real estate properties have the potential of improving the sustainability performance of the company, reporting standards added sections in the report during the last decade, which incorporate characteristics of corporate real estate (GRI, 2011). Although, according to the research of Laposa and Villupuram (2008), organizations do not address corporate real estate in CSR reports in a consistent way. The lack of real estate coverage, consistency, scope and transparency makes it hard for stakeholders to compare the sustainability performance of the real estate portfolio of similar organizations. If the internal and external stakeholders of an organization would like to base their decision on the sustainability performance of an organization to invest in, buy their products or services, work with and work for an organization, the sustainability performance should be transparent and consistent. It would thus be of interest to learn how and why organizations implement and report about the sustainability of their corporate real estate in the first place, which indicators organizations use to report about their corporate real estate and to find out the discrepancy between the implementation and reported indicators of efforts to improve the sustainability within the organization. The analysis of the indicators used to report

about the sustainability of the corporate real estate portfolio and the discrepancy between the implementation, will help corporate real estate managers with the process of implementing and reporting on sustainability in their real estate. In addition, this research could provide valuable information for organizations, like GRESB B.V., to create products or services to support corporate real estate managers when they want to improve the corporate real estate sustainability performance of the organization.

1.3   Problem outline

This section outlines the problems encountered in the existing literature on how organizations measure and report the sustainability performance of their occupied real estate. There is a focus in the existing literature, which evaluates how sustainability can be measured, current methods to report the CRE sustainability and the benefits of green buildings on the core business of organizations. This section will be concluded outlining the problem in the existing literature and how this research thesis will contribute to fill this gap.

The management of real estate within organizations has not been part of the corporate strategy for a long period of time, but has been acknowledged as an important resource of the company during the last two decades (Heywood and Kenley, 2008). The main function of corporate real estate in an organization is to assist the organisation's strategy and core business (Haynes and Nunnington, 2010). Haynes and Nunnington, (2010) define the management of the corporate real estate portfolio as: "a resource to serve the needs of the core business in order to add maximum value to the organization and to contribute to the overall performance of the company."

A limited amount of researchers has investigated the relationship between the benefits of sustainability and the management of corporate real estate. In a research within service sector companies, Junnila (2004) points out that corporate real estate has become a useful resource in the environmental strategy of organizations. In addition, Ellison and Sayce (2007) claim that organizations put more importance on sustainability within their real estate properties since sustainability has a relation with the property value and if the properties are future proof. Furthermore, Runde and Thoyre (2010) state that management of corporate real estate in a sustainable fashion is becoming more relevant since it can affect business decisions in most industries and influence the market value of the properties in a positive way.

However, organizations still struggle to measure and relate the different aspects of sustainability when corporate real estate is managed (Masalskyte et al., 2014). Masalskyte (2014) proves that there is a lack of knowledge within organizations with regard to the area of implementing sustainability. Likewise, Lucas (2010) states that organizations, which have been fixated on the implementation of corporate social responsibility, do not really identify sustainable corporate real estate measures or indicators when their CRE properties are managed.

The development of corporate social responsibility has led to an emerging body of literature, and some of the researchers focus on the corporate real estate content. On the one hand Kolk (2003) and Milne and Gray (2008) prove that corporate social responsibility reports have significantly increased in quantity. On the other hand, Kolk and Perego (2008) state that the reports show significant differences across geographies, governments, and stakeholder participation. First, Paul (2008) points out that the global 100 most sustainable companies only report a minimum of information about the corporate real estate. Second, the research of Laposa and Villupuram (2010) suggests that the disclosure of corporate real estate in CSR reports is lacking and lacks

consistency, transparency and coverage. Although, there is a significant improvement of CRE coverage when the value of the corporate real estate assets is higher (Laposa and Villupuram (2010).

Some of the literature claims that sustainability is getting more important in corporate real estate decisions (Nappi-Choulet et al., 2013, Dixon et al, 2009). Nappi-Choulet and Déchamps (2013) state that the location strategy of listed companies in France is strongly influenced by the sustainability performance of the building, but they mention that this strongly depends on the ownership of the office. In contrast, Dixon et al. (2009) suggest that the geographical location, available buildings and the building quality overshadows the importance of sustainability, but sustainable buildings are none the less becoming more important. Similarly, Levy and Peterson (2012) point out that companies take the priorities of the staff, marketing and flexible office space higher into account than sustainability features when choosing a new building. Although there are some differences between the opinions of the researchers, it is clear that sustainability is an emerging topic in the strategy of companies. Another reason for companies to pay a rent premium and concentrate on sustainability is found in branding of the company's image. Eichholtz, Kok and Quigley (2010) state that companies, that concentrate on sustainability, are able to attract higher qualified employees and promising investors. This could be an incentive for corporate real estate executives to incorporate sustainability within their long term strategy and short term decision making.

Previous research has tended to focus on the potential value of sustainability on companies, which own and occupy the buildings, rather than on the process of implementing and reporting about the sustainability of the corporate real estate portfolio. These aspects are important to identify when an organization decides to implement sustainability in the corporate real estate portfolio and if they want to communicate this performance to their stakeholders through their CSR report.

1.4   Problem statement

This study explores the current indicators used when implementing and reporting corporate real estate sustainability and deepens the knowledge about the bottlenecks of corporate real estate managers to implement and report the sustainability performance of the corporate real estate portfolio. The subject of the research is:

The process of measuring, implementing and reporting of the sustainability performance in the Corporate Real Estate portfolio.

As discussed in the problem outline, research shows that organizations experience the benefits of sustainability in their corporate real estate. Therefore, organizations are reporting and implementing sustainability in their corporate real estate portfolio. The process to implement sustainability in the corporate real estate portfolio has not been researched in previous papers. Organizations are reporting about their sustainability performance using reporting guidelines and standards. These standards assess the overall sustainability of the company, but specific real estate aspects are not dealt with sufficiently in CSR reporting (Villupuram and Laposa, 2010), although corporate real estate accounts for almost half of the emissions of an organization. In order to investigate this problem, the following central research question will be answered:

To what extent and why do organizations implement an report sustainability of their corporate real estate portfolio and what are the possible bottlenecks to implement and report sustainability?

To be able to answer this main research question, the following six questions will be discussed:

- What is corporate real estate sustainability management and how can it add value to organizations?

- Which sustainability indicators related to corporate real estate may affect the added value of the corporate real estate portfolio on the performance of the organizations?

- To what extent do organizations report about sustainability of their corporate real estate portfolio to stakeholders?

- Which indicators do organizations use to report the sustainability performance of their corporate real estate portfolio and which characteristics of the organization influence the reported indicators?

- What are the barriers when corporate real estate managers report about the sustainability of their corporate real estate portfolio?

- Why do organizations report about the sustainability of their corporate real estate portfolio and is that consistent with the indicators which have been implemented in the CRE portfolio?

1.5   Target group

The scope of the research is limited to doing research on the process of implementing and reporting sustainability of the corporate real estate portfolio. The corporate real estate portfolio differs between all organizations as it depends on many different characteristics of the organization. As the corporate real estate portfolio of the larger organizations has a bigger influence on the organization and the environment, this research will focus on the larger organizations in the world.

The fortune Global 500 contains the largest companies of the world according to the average market value in 2014 (Fortune, 2014). Almost all of these organizations have a public responsibility to report to their stakeholders about their sustainability performance. Most of these organizations feel the need to publicly disclose a CSR report, which gives an overview of current methods to improve the sustainability of the organization. In addition, these organizations occupy large real estate portfolios to support the core business and the impact of the occupied buildings on the environment is therefore significant.

1.6   Research design

This section gives an overview of the process when the research was conducted. During the preparation phase, the problem has been explored and translated into research questions. Based on the research questions, methods were examined to find answers for these questions. The first two sub questions will be answered by conducting a review of the existing literature. When the scope of corporate real estate sustainability management and its added value is determined, the commonly used sustainability indicators related to corporate real estate will be defined.

When the indicators described in the existing literature are determined, the research will focus on the analysis of Corporate Social Responsibility reports of the target group. By gathering information about the sustainability indicators of corporate real estate management, it will be possible to prepare and conduct the content analysis of the CSR reports. In order to answer the last two sub questions, semi-structured interviews will be conducted to contribute to the qualitative research and will give insight in the process of implementing and reporting corporate real estate sustainability by an organization.
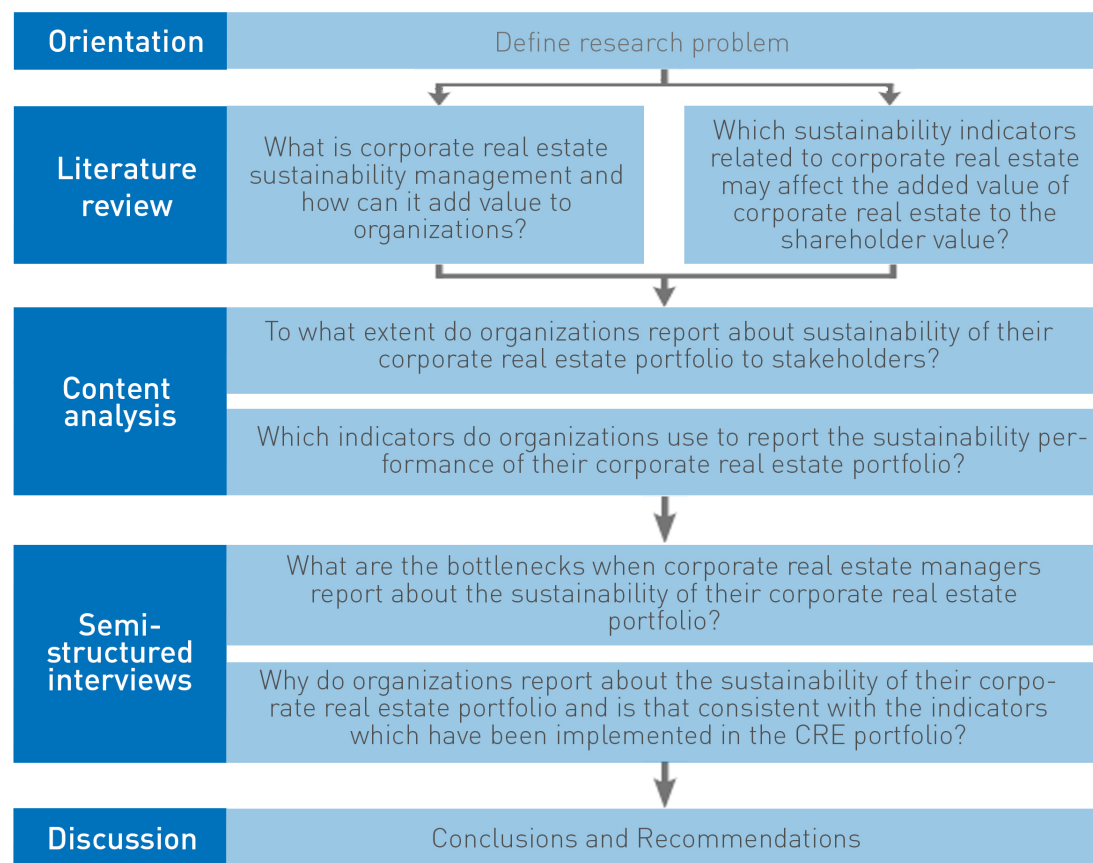
Figure 3: Research process infographic

Literature review
The literature review and desk research will be executed through descriptive research. The literature review gives an overview of the current knowledge of corporate real estate management, sustainability and will combine these two topics into corporate real estate sustainability management. Finally the current sustainability indicators used by corporate real estate managers to implement and report their sustainability will be discussed.

Content analysis
In order to investigate to what extent and which indicators organizations use to report the sustainability performance of their corporate real estate, research will be conducted on the publicly available sustainability information in their CSR reports. The focus of the content analysis is on the CSR reports of the companies in the Fortune 500 global list.

Semi-structured interviews
Semi-structured interviews will be conducted with CRE managers to understand how corporate real estate managers currently implement and report the sustainability performance of the corporate real estate portfolio. In addition, the interviews are conducted to gain an impression of underlying bottlenecks and processes when implementing and reporting the sustainability performance and to provide insights into the setting of sustainability at CRE occupiers. This could result in generating ideas and/or hypotheses for later quantitative research. The interviews will be used to uncover prevalent trends in sustainability reporting and opinions of corporate real estate managers. Besides that, we will have a discussion about what the preferred way of implementing and reporting will be for them in the future and how this can be improved.

1.7   The scientific and practical relevance

The scientific relevance of this research is to deepen the knowledge regarding the process of corporate real estate executives to implement and report on the sustainability performance of corporate real estate. As a limited amount of researchers has investigated the relationship between the benefits of sustainability and the management of corporate real estate, this knowledge could lead to more quantitative research in the research field of corporate real estate management. Besides that, corporate real estate managers can use the knowledge to implement and report sustainability in a more structured and transparent style in their real estate portfolio using the identified sustainability indicators when implementing and reporting about their corporate real estate portfolio.

The practical relevance of this research is to improve the sustainability performance of occupied real estate and hence reduce the consequences of organizations on the environment. Since corporate real estate is only acknowledged as the fifth resource of an organization, sustainability measures at a CRE portfolio and property level are often forgotten by the organizations and only used as a resource to reduce operational costs of the company. In the meantime, existing research confirms the benefits of green buildings on energy savings, higher occupant satisfaction and lower greenhouse gas emissions (Powell, Fowler and Parman, 2009). In addition to these benefits, governments will increase and harden regulation on organizations to reduce their ecological footprint, which will have influence on the properties of the organizations as well. Therefore, suggestions to improve how organizations implement and report the performance of their real estate portfolio is already valuable or it will become valuable for new organizations in the near future.

This research thesis could also be a starting point for the inception of a global real estate sustainability benchmark for corporate real estate occupiers. Currently, GRESB is conducting an annual survey for the owners of commercial real estate, the real estate investors. As the institutional investors of the real estate investors are requesting transparency about the sustainability performance, they submit data to GRESB in order to inform their institutional investors. In the near future, institutional investors of organizations, which are not focused on real estate, could request more transparency of the sustainability of their corporate real estate portfolio. It is therefore of interest for GRESB to investigate the current indicators used in the corporate real estate market. Besides the institutional investors of organizations, other stakeholders like the

customers, employees or suppliers could request more transparency about the sustainability of the CRE portfolio in the near future.

1.8   Thesis layout

Chapter 2: Corporate real estate management
An introduction to corporate real estate management at organizations will be discussed. The background of CREM will be elucidated on how it evolved from an operational asset to a more strategic asset through which companies can add value to the organization. The scope of CREM in this thesis will be defined, since there are many different interpretations used in the real estate sector.

As a second topic in this chapter, sustainability will be introduced and how it evolved from a trend into a sophisticated topic during the last decades. Organizations are becoming aware of the benefits when sustainability is implemented in the corporate real estate portfolio, and they acknowledge the potential disadvantages when sustainability is not used in the decision making.

The first two topics of this chapter, CREM and sustainability, are combined into the sustainable management of corporate real estate. When the scope of corporate real estate sustainability management is defined, the drivers of implementing sustainability in the occupied buildings will part of the discussion. Finally, the reasons why sustainability has not prevailed in the real estate market are discussed.

Chapter 3: Corporate real estate sustainability indicators
In this chapter, the sustainability indicators used by corporate real estate managers to implement and report sustainability in the CRE portfolio are provided and explained in detail. Based on these indicators, the generic sustainability maturity model for CREM by Masalkyte et al. (2014) is part of the discussion.

Chapter 4: Research design
The coherence of the two research methods, content analysis and the interviews, will be discussed as well as how these methods will answer the research questions. The relevant CRE sustainability indicators will be determined for the content analysis, next to how these indicators will be checked in the CSR reports. Besides the content analysis, the semi-structured interviews will be part of the discussion. The structure of the interview script will be explained and how the interviewees were selected.

Chapter 5: Research results
This chapter will discuss the results of the logistic regressions based on the data retrieved via the content analysis. The results of the semi-structured interviews with corporate real estate managers in the Netherlands will be interpreted. The descriptive statistics of the content analysis and the interviews are provided and discussed. Finally, the actual results of both research methods are interpreted and the conclusions of the research results are clarified.

Chapter 6: Conclusions and recommendations
The final chapter of this thesis is dedicated to draw the conclusions based on the literature study and the research results. A recap of the previous chapters will be discussed and in addition the research questions will be answered separately. A reflection on how the research was conducted and suggestions for improvements are expressed. Finally, the recommendations for the corporate real estate managers on how to implement and report about the sustainability performance of the corporate real

estate portfolio and GRESB will be presented and suggestions for further research are presented.

1.9   GRESB B.V.

The thesis has been executed at GRESB B.V. in Amsterdam, the Netherlands. GRESB B.V. is an industry-driven organization committed to assessing the sustainability performance of real estate portfolios (public, private and direct) around the globe. The dynamic benchmark is used by institutional investors to engage with their investments with the aim to improve the sustainability performance of their investment portfolio, and the global property sector at large.

The real estate portfolios are scored based on seven sustainability aspects, specifically defined for real estate investment portfolios. The benchmark gives more structure for real estate investment companies to improve their overall sustainability performance. The weight of the different aspects to calculate the overall GRESB score is illustrated in figure 2.
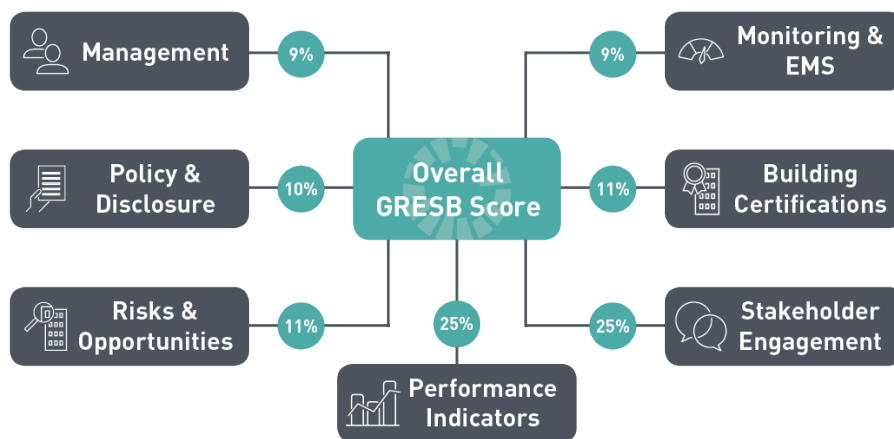
Figure 4: Seven aspects used in the GRESB benchmark

GRESB B.V. has especially helped with identifying relevant sustainability indicators through their extensive knowledge in the field of real estate sustainability. Besides that, GRESB supported with establishing a link with the professional field of corporate occupiers to conduct the semi-structured interviews.

2. Theoretical framework

The general focus of the research will be in the field of corporate real estate. First a general overview of the corporate real estate market will be provided. Then the benefits when organizations manage their corporate real estate in an active way will be discussed next to the relation between the commercial real estate market and the corporate real estate occupiers.

In this framework several topics will be addressed, starting from the introduction of corporate real estate. First the general corporate real estate market is described through a rather summarized perspective. Consequently the role of the landlord is explored and described. As the perspective of the landlord is defined, the integration of sustainability at company level can be shown. The literature review is continued with the current condition of sustainability investments regarding institutional investors or funds. What does the organization gain when investing in sustainability, improved return, occupancy rate or corporate image? This evidence is concisely concluded while describing the added value of corporate real estate sustainability management.

2.1   Corporate real estate management

When corporate real estate is managed, it demands a different approach than the management of real estate as an investment. De Jonge (1997) divided the management of corporate real estate into a model with four different fields of focus, to point out the main difference between corporate real estate management and real estate management.
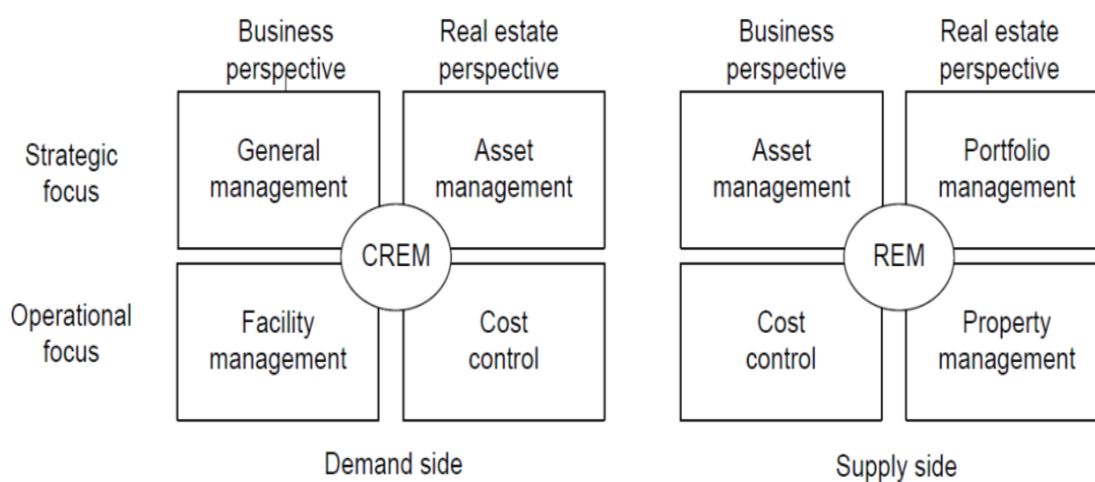
Figure 5: Difference between CREM and REM (De Jonge, 1997)

Corporate real estate refers to the use of real estate, as part of business operations and related activities to support the business. It can therefore be argued that all companies make use of corporate real estate in a certain extent. Corporate real estate portfolios consist of properties that the company owns and/or leases for its own operational purposes. Although the main purpose of the corporate real estate portfolio is to facilitate and support the core business of the company, it represents a significant proportion of the total assets of most of the companies. On average, it is the second highest expense after employee costs, and based on estimates it accounts for about 20 to 30 percent of

the total assets of companies in the United States and 30 to 35 percent in the United Kingdom (Würdemann, 2012). The management of the corporate real estate portfolio gained importance and corporate managers have focused on improving the use of this asset class. The definition of corporate real estate management has been formulated as:

"The management of a corporation's real estate portfolio by aligning the portfolio and services to the needs of the core business (processes) in order to obtain maximum added value for the business and to contribute optimally to the overall performance of the corporation." (Krumm, Dewulf and De Jonge, 2000).

2.1.1 History of corporate real estate management

Corporate real estate management has been acknowledged as an important asset to implement in the overall strategy of the organization, but before that, CREM went through several different stages. Brounen, Verschoor and Würdemann (2012) have described the evolution in five stages: denial, anger, bargaining, depression and finally the acceptance of CREM. According to these five stages, the history of CREM will be briefly discussed.

The management of corporate real estate has been undervalued in many organizations during the beginning of industrialization. Corporate real estate was only recognized as an operational asset in which the employees were carrying out their day-to-day tasks. Since the management of real estate was not part of the core business and therefore not part of the expertise of the organizations, it was difficult to manage their corporate real estate in the most cost efficient way. This is better known as the period in which organizations denied the potential value of corporate real estate for the core business. When organizations realized that corporate real estate became a large percentage of the total assets, the C-suite of the organizations were angry that they did not actively manage their owned or leased properties. When the executives involved themselves in actively managing the CRE portfolio, CRE was generally used to reduce the operational costs and the property value on the balance sheet in order to primarily support the core business of the organizations. The third stage was described as the bargaining period, since executives started to acknowledge CRE as a strategic element to add value to the organization. Some researchers even claimed that CRE was becoming the fifth business resource after capital, human resources, technology and information. Even though the emphasis when CRE was managed was to reduce costs, some organizations came to realize that CRE could have other benefits, like increasing the productivity and image of the organization. During the depression, CRE was mainly used to reduce the costs of doing business and to free up capital for the core business. When organizations were having trouble to compete with the peers or needed cash to survive a crisis, they would sell the CRE to survive. The CRE assets were mainly used as a backup for companies, which were in trouble. The last stage of the evolution is the acceptance of CREM as a strategic resource to add value to the overall business performance. At some of the larger organizations, the CRE strategy is fully aligned with the strategy of the organization to contribute to the organization's mission and visions.

2.1.2 Characteristics of corporate real estate

The properties of a corporate real estate portfolio contain all different property types used by the organization to execute the core business of the organization. Depending on the requirements of the core business, the corporate real estate portfolio often consists of a mix of offices, logistical assets, manufacturing sites and retail assets. These real estate assets and accompanying properties are used to accommodate the space to work, infrastructure and additional investments of the organization, which are all focused on the execution of the core business (Joroff, 1993a).

The decision of an organization to own or lease corporate real estate has often been subject of research. The lease versus purchase decision is often made on a strategic level, since a significant portion of the total assets can either be used as an investment asset when owned or the capital can be used to improve the core businesses when the properties are leased. In this thesis, all different types of property and ownership are evaluated, although the difference between these types will be accentuated when the content analysis of the CSR reports is executed and the semi-structured interviews are conducted.

2.1.3 The added value of corporate real estate management

The environment in which organizations operate nowadays is constantly developing and has become dynamic due to the development of technology. In order to sustain and adapt to these dynamic market demands, organizations need to align all assets with the overall strategy of the organization to optimize the added value of these resources. Since corporate real estate is an illiquid asset, organizations came to realize that real estate should be used as strategic assets rather than only operational. In order to keep ahead of the peers in the market, the corporate real estate portfolio needs to be part of this long term strategy, especially since real estate assets are hard to adept due to the illiquidity and high transformation costs.

This trend has been illustrated by Lindholm et al. (2006), their research showed that CREM is evolving into a strategic asset class and that organizations should implement a CRE strategy in order to be proactive rather than reactive. Figure 4 illustrates that the primary goal of an organization is to maximize the value of the shareholders. Organizations develop business strategies to achieve this goal in the most efficient manner.
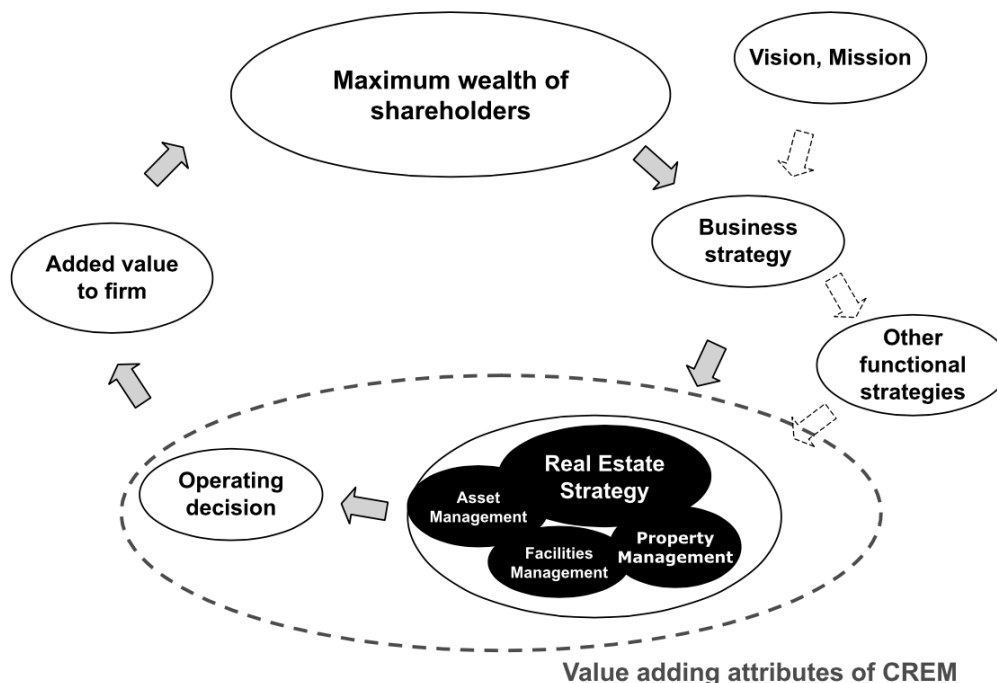
Figure 6: CREM as a part of the firm's strategic framework (Lindholm et al. (2006)

Organizations can use different real estate strategies to maximize the wealth of the shareholders. Based on previous research and interviews with 26 organizations, Lindholm et al (2006) developed a model with eight real estate strategy levels. These eight real estate strategies can either add value to the organization by increasing the growth in revenue or improving the profitability of the core business. When either the revenue or profitability grows, the goal is always to eventually maximize the wealth of the shareholders. Generally organizations are not focused on one strategy to maximize the wealth, but they combine these strategies when they manage their corporate real estate. Organizations combine strategies in order to influence the profitability and revenue depending on the business strategy.

A growth of revenue can be accomplished by managing the corporate real estate with either a strategy to increase the value of the assets, use it as a resource to improve the marketing or sales, increase the ability of employees to be innovative or to increase the employee satisfaction. To realize a growth of profitability, organizations can choose to use their corporate real estate portfolio to increase the efficiency and productivity of the employees. This can be achieved by enabling flexibility, increase the employee efficiency by enhancing the productivity and by reducing the operational costs of the real estate. In 2012, Lindholm et al. conducted more interviews to test if the seven strategies were still relevant for most of the organizations, which led to a revised model that included the support of environmental sustainability as the eight strategy (figure 5).
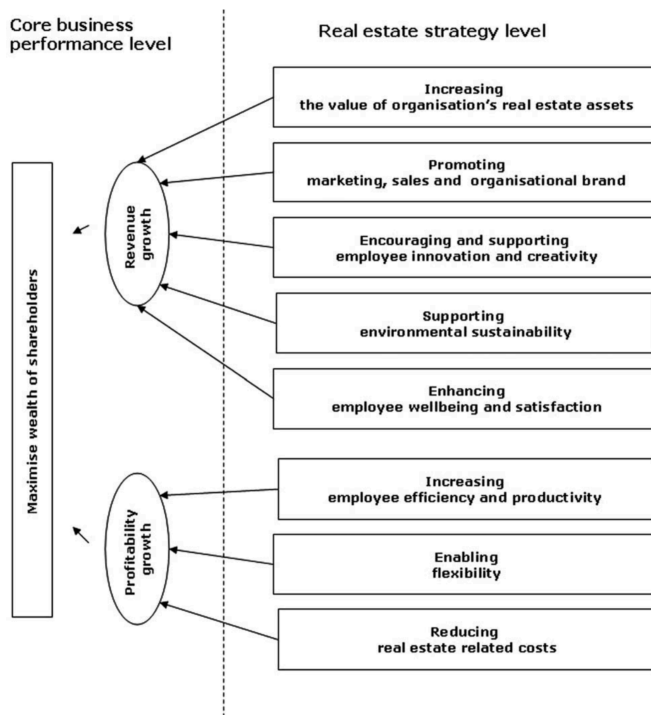
Figure 7: Revised model of the relation between CREM and the core business strategy

The revised model of Lindholm et al (2012) also mentions the support of the environmental sustainability as an important strategy to increase the revenue stream of an organization. According to the interviewees in Lindholm et al.'s (2012) research, the influence of corporate real estate on the environmental sustainability and corporate social responsibility has gained increased emphasis in CREM. The management of CRE is realizing that sustainable buildings can support the revenue growth by reducing the operational costs; improve the image of organization, higher productivity and employee satisfaction.

2.2 Sustainability

Sustainability has been a trending topic during the last decades and nowadays it is integrated in almost all things in the daily life of western society. The importance of sustainability was not recognized until the late 60s, when people got more and more concerned about the degradation of the environment. It was only when Bruntland's report (1987) provided the first recognized documentation of the influence of society on the environment. That report (Bruntland, 1987), with the title 'Our common future', formulated a definition for sustainable development as: "In essence, sustainable development refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition has been commonly used and cited as the general definition of sustainability, as it covers two important aspects of sustainability. First, it refers to the current urgency to support the essential needs of the world population. And as a second piece of the definition, it discusses the impact of the social and technologic growth, without undermining the capacity of the environment to meet the needs of the future.

Although the definition in the Brundlandt report (1987) is used by many researchers, it can be interpreted in many different ways since it has a broad scope. In this paper, the more comprehensive approach of the 'triple bottom line' will be used when referring to sustainability. Berkovics (2010) described the balance between the economic influence on the environmental and social consequences in an organization, which led to an infographic with the three pillars of sustainability connected and related to each other (O'Riordan et al, 2001) (figure 6). The infographic illustrates that society and organizations are only able to be sustainable when the economic values, social well-being and environment are related to each other.

Figure 8: Three Pillars Model (O'Riordan et al, 2001)

Before sustainability was broadly acknowledged as a relevant topic, organizations were primarily focused on the economic benefits of their decisions. Nowadays, when organizations make 'responsible' decisions or investments, the three pillars are covered

and the association between them should be taken into account. This means that organizations should also focus on the two other pillars in the model when a decision is based on the economic benefits.

2.2.1 Corporate social responsibility

Since the urgency of sustainability became more apparent during the last three decades, governments increased their emphasis on how society handles the impact on the environment. By introducing new regulations and subsidies, governments have tried to point organizations in the right direction of creating a more sustainable environment (European Union, 2011). This can be seen in the increase of taxes for polluting companies, like oil refineries, and high subsidies when companies generate and use renewable energy.

Besides the wider governmental regulation, businesses are becoming more aware of the consequences of their operations and their responsibility towards all their stakeholders now and in the future. As a form of self-regulation to integrate sustainability in the core business strategy, organizations define the different aspects of sustainability in the so-called corporate social responsibility (CSR). At many organizations, especially those that operate on an international level, CSR has become a vital part of the overall business strategy to integrate the triple bottom line (economic, social and environmental) requirements into their business operations and reporting (Haynes and Nunnington, 2010). CSR is therefore strongly related to the business objectives of sustainable development and the previously mentioned triple bottom line.

Besides the reason to do the right thing and to comply with the minimal regulations of the governments, research has shown that CSR has multiple benefits for organizations. According to Collier and Esteban (2007) commitment to CSR, results in a better reputation that makes it easier to recruit and keep employees at the company, with reduced costs and disruption of recruitment as a consequence. CSR can make the business operations more competitive and reduces the risk of sudden damage to your reputation (Verhoef et al., 2011). Investors recognize this and are more willing to finance these more responsible and future proof businesses.

2.2.2 CSR reporting

Corporate social responsibility has gained a lot of ground during the last decade, primarily to do the right thing, to improve the reputation and live up to the demand of the stakeholders. To let the stakeholders know how the organization is performing, organizations compile and communicate their CSR performance via CSR/sustainability reports to their stakeholders. CSR reports contain the key performance indicators of sustainability to give an overview of the CSR performance of a company.

The demand for more transparency in the real estate market by stakeholders has led to the development of many reporting and rating standards. These standards cover different types of levels in which they provide their services to the organizations. Figure 7 illustrates how these different levels are positioned in the real estate market and which reporting or rating standards are covering these different levels. This figure is based on the perspective of real estate investment organizations. Some of these standards can be used by an organization that manages a corporate real estate portfolio.

Figure 9: Frameworks to report and benchmark in the real estate market (GRESB, 2014)

Organizations that occupy real estate can implement some of these standards on the organizational and building level. When their CSR performance is disclosed to the stakeholders, they can adapt to the guidelines of the Global Reporting Initiative (GRI). To provide the information for these CSR reports, CRE managers can use data collection systems on the portfolio level. These systems gather the sustainability data of all occupied buildings and provide a tool for CRE managers to keep track of the consumption and performance of the buildings. At the building level, organizations can track and benchmark the sustainability performance of the individual occupied buildings. Around the globe, different building certifications have been developed to distinguish the performance of a sustainable building.

Global reporting initiative
The Global Reporting Initiative is one of the organizations that developed guidelines for the CSR communication of organizations. These guidelines have specifically been developed to help organizations when the CSR reports need to be compiled and published by the organization. GRI has improved the standards of CSR reporting, which leads to more transparency and the ability for investors to compare the performance of the organizations.

GRI tries to cover all sustainability aspects of an organization, and provides certain supplements for specific industry groups. GRI has put more emphasis on the performance of the corporate real estate portfolio in the general guidelines in recent years, and has developed a supplement which is specifically made for the real estate sector. This supplement, which is called the Construction and Real Estate Sector Supplement (CRESS), has been developed for organizations that actively manage their corporate real estate portfolio.

Corporate real estate sustainability reporting
In the general GRI guidelines, there are instructions to report about corporate real estate. Examples are the reporting of the sustainable certification systems, certifications of the buildings and the used materials, energy and water intensity and the greenhouse gas emissions of the occupied buildings. Laprosa and Villapuram (2010) mapped the guidelines of GRI, which were related to CREM in appendix 1. They proposed amendments to make the guidelines more specific. Although corporate executives have been acknowledging the fact that corporate real estate can contribute to the overall sustainability performance of the organization (McGraw-Hill Construction, 2013) and GRI provides some guidelines for corporate real estate aspects, the reporting of CRE aspects in CSR reports has not been implemented in a transparent and consistent way (Laprosa and Villapuram, 2010).

Research amongst 45 CSR reports (Laprosa and Villapuram, 2010) claims that there is still a lack of transparent and consistent disclosure of certain sustainability aspects of corporate real estate in CSR reports. Laprosa and Villapuram (2010) conducted a content analysis on the CSR reports by searching and counting specific textual queries. The textual queries were based on existing literature, which was summarized in four primary variables (Figure 8). The primary variables used in the content analysis were the facility certifications, CRE references, GRI CRE references and Facility and Sustainability.

Exhibit 6 | Nodes to Summary Variables

Referenced Nodes	Associate Primary Variables
CASEBEE, BREEAM, or ENERGY STAR, ISO 14001 and corporate properties, LEED	Facility certifications
Community lands, corporate properties references, real estate taxes, specific real estate references	General corporate real estate
EN11, EN12, EN13, EN14, EN15, EN16, and EN17	GRI CRE references
Emissions management, facilities and the environment, facilities and GHG, facilities and waste management, real estate energy usage, supply chain third party references	Facilities and sustainability

Figure 10: Variables and referenced nodes (Laprosa and Villupuram, 2010)

2.3 Corporate real estate sustainability management

The two main themes of this master thesis, CREM and sustainability, have been separately discussed in the previous two paragraphs. These themes will be combined in the course of this paragraph in which the literature about corporate real estate sustainability management will be discussed.

When the topics are combined, the added value and the possible barriers when sustainable features are implemented and reported will be discussed. First, a brief introduction of sustainability in corporate real estate management will be discussed. Then the definition of CRE sustainability management will be defined, which will be used in the content analysis and semi-structured interviews. In the third subparagraph, the added value of sustainability in the corporate real estate portfolios are evaluated based on existing literature. Finally the CRE sustainability indicators used by CRE managers and referenced in the literature are summarized and discussed.

2.3.1 Introduction to CRE sustainability management

The implementation of sustainability in the corporate real estate portfolio of an organization is a relatively new phenomenon for corporate real estate managers. The available literature is, compared to other strategies of CREM, relatively limited and has only seen a growth during the last decade when sustainability became a trend. As mentioned in paragraph 1 of this chapter, corporate real estate management has developed from a solely operational asset to a more strategic resource for organizations. The aim of organizations is to align the real estate strategy with the organizational strategy to maximize the added value of the shareholders. Haynes (2012) compiled a list of components that should be aligned with each other to achieve this goal. The components are planet, position, purpose, place, paradigm, processes and people to improve the overall performance and productivity of the organization. Although the knowledge of the benefits of sustainability in CREM became more noticeable in recent years (Corenet, 2012), Haynes (2012) was one of the first researchers that acknowledged the fact that the component "planet" was a concern when managing and aligning corporate real estate with the organizational strategy.
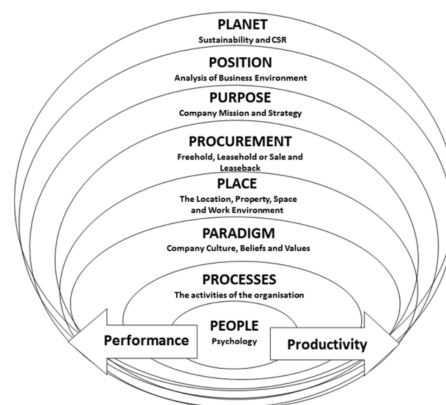
Figure 11: Corporate real estate asset management alignment model (2012)

Corporate social responsibility has become more important in organizations in order to reduce the impact on the environment. Given that CRE accounts for more than 20 percent of the energy consumption and one third of the greenhouse gas emissions, organizations came to realize that CRE plays a significant role in the sustainability

performance. Therefore organizations are more and more concentrating on sustainability and adding CRE to their corporate social responsibility policies (Haynes and Nunnington, 2010).

2.3.2 Definition of CRE sustainability management

A clear definition of sustainability in CRE has not been defined in existing literature about this topic. In the beginning of chapter 2, the definition of CREM was defined as:

"The management of a corporation's real estate portfolio by aligning the portfolio and services to the needs of the core business (processes) in order to obtain maximum added value for the business and to contribute optimally to the overall performance of the corporation." (Krumm, Dewulf and De Jonge, 2000)."

In paragraph 2.2, the definition of sustainability at organizations was explained and defined as:

"Corporate social responsibility is part of the business strategy in order to give structure to and integrate economic, social and environmental imperatives into their business operations and interactions with their stakeholders."

Corporate real estate sustainability management can be explained by combining these definitions in a reconstructed version, like the UNEP (2014) stated:

"Building on these definitions, Corporate Real Estate Sustainability Management (CRESM) thus refers to the integrated management of all economic, environmental and social aspects of an organisation's property (real estate) activities and associated investment decision-making. It comprises and applies to all relevant strategies, processes and organisational structures that support corporate governance and sustainable business and product development."

In addition, the UNEP (2014) explains:

"Successful CRESM requires a holistic and systematic approach across the whole organisation. This includes an in-depth analysis of different stakeholders' information demands within different decision-making contexts. For example, it must address different hierarchical levels (i.e. corporate level, portfolio level, single building level), different analytical methods and it must provide a profound explanation of impact chains (i.e. interrelationships between physical property characteristics, actual performance and corporate goals and economic success factors)."

2.3.3 Drivers of Corporate real estate Sustainability

The strategy to support the sustainability performance of the organization has been ranked by CRE managers as the sixth most important of the eight strategies (Lindholm et al., 2012). The criteria factors, which the CRE managers associate with sustainability, are:

- Use of environmental friendly cleaning materials
- Access to reports that document the environmental impact of the building
- Building recycling program
- Environmentally certificated building
- Energy efficiency

Drivers of corporate real estate managers to implement, measure and report sustainability range from regulations of the national government to the demand of the stakeholders. The various drivers require occupiers of real estate to reconsider their responsibilities to reduce the ecological footprint of the organization. The World Green Building Council created an illustration of the specific and common drivers of the developers, owners and tenant/occupiers of the buildings (figure 10).
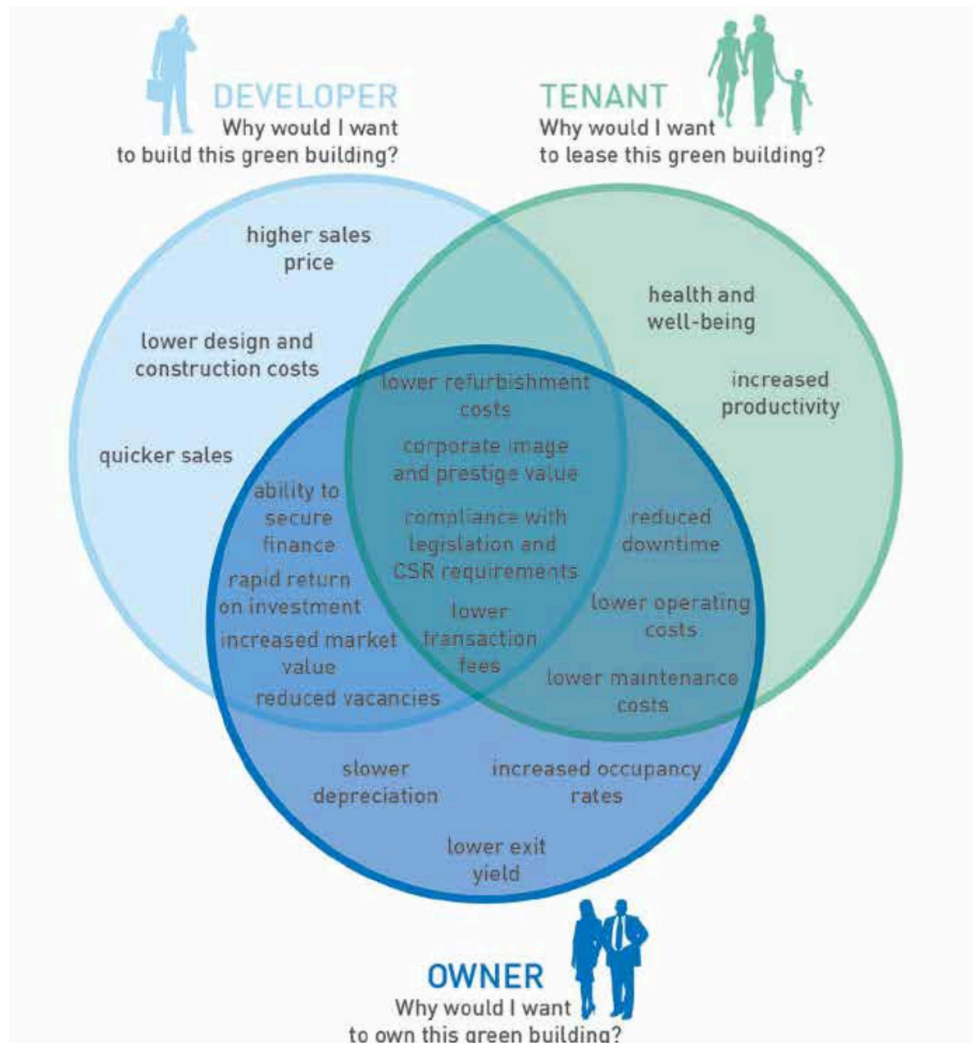
Figure 12: Drivers of sustainability in the real estate market(WGBC, 2013)

In this paragraph, emphasis is placed on the different drivers of sustainability, which are relevant for the occupiers of real estate. Masalskyte et al. (2014) claim that the drivers of the organization depend on the industry group in which the organization is operating. Although the differences between different industries, the drivers can be allocated in three different levels, external-, corporate- and building- level drivers (Falkenbach et al., 2010).
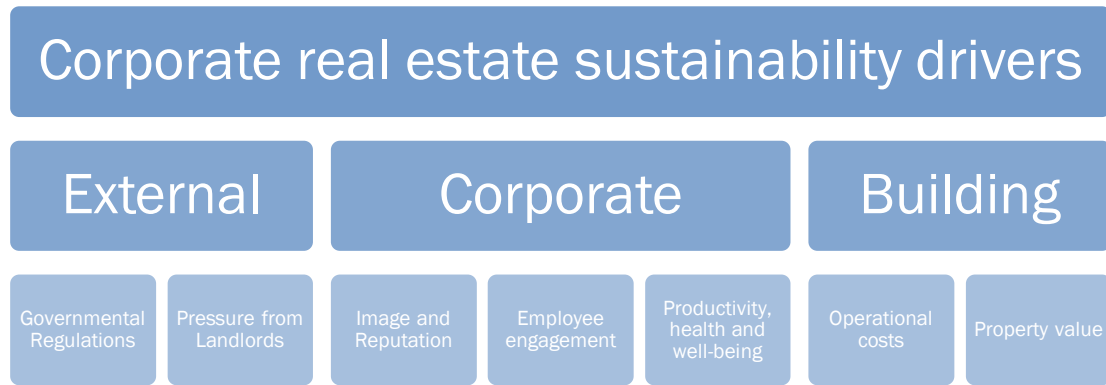
Figure 13: Levels of CRE sustainability drivers

External drivers
In 2014, the European union committed to an overall climate and energy package with binding legislation to reduce the greenhouse gas emissions by 20%, increase the percentage of energy consumption produced from renewable energy and to improve the energy efficiency with 20% (European Commission, 2014). These targets are also known as the "20-20-20 plan" of the European Union. Although these targets are mainly focused on the tasks of the government, some of the policies have direct consequences for especially the larger organizations.

Some of the policies have direct consequences for the corporate real estate portfolio of the organizations. The most argued policy in the real estate market is the mandatory energy performance certificates (EPC's) when buildings are sold or rented. In the Netherlands, the relevance of this policy was part of a public discussion and if this would eventually improve the energy efficiency. The government in the United Kingdom went even further than the mandatory EPC's in the commercial real estate market, such as offices, logistic centers and retail. From 2018 onwards, the regulations in the United Kingdom will make it illegal for landlords of commercial real estate to let out buildings with the two lowest ratings of the EPC, label F or G (Government of UK, 2014). These regulations will not directly affect the occupiers of commercial real estate, unless the organization owns buildings with an F or G label. Although the regulations to report about the corporate social responsibility could argue that the EPC regulations also affect the leased part of the CRE portfolio, since stakeholders can pressure them to disclose the average EPC rating of the leased buildings.

Another mandatory policy is that large organizations need to conduct energy audits at least every four years. This will make organizations aware about the energy consumption of their corporate real estate and the possibilities to reduce this amount. Organizations will be able to report the real-time and historical energy consumption in order to protect the rights of the consumers to receive easy and free access to the energy data. Moreover, Makower (1994) suggest that organizations which have been leaders in the field of sustainability, maintain better relationships with the government. They could be less vulnerable to sudden changes of the law and the risk for the organization can be reduced.

Besides the harsher legislation of the governments, commercial real estate investment companies are becoming more aware of the benefits when their real estate portfolio is more sustainable. Due to pressure of their investors and in order to improve their sustainability compared to their peers, they communicate their sustainability performance to their shareholders. The Global Real Estate Sustainability Benchmark, better known as GRESB, provides the commercial real estate market with a tool to accomplish this goal to be more transparent to the shareholders. According to GRESB (2014), 72 percent of their 637 surveyed organizations have a tenant engagement

program in which they meet with the tenants to provide them with sustainability guides and give the tenants feedback on the energy/water consumption and waste. One third of the landlords even provide tenant sustainability training to reduce the influence of the tenant on the environmental footprint of their building. The pressure of the commercial real estate market on the occupiers of the buildings can be a driver for the occupiers to improve the sustainability of the CRE portfolio. Especially when the owners and occupiers team up to improve the performance of the buildings, an immense reduction of energy, water and waste can be established (EPA, 2014).

Corporate level drivers
Apart from the external drivers, on which the organizations have less influence, there are drivers to implement sustainability in the CRE portfolio in order to improve the performance on the corporate level. During the first stage of implementing sustainability, it was a trend to improve the image and reputation of the organizations by doing a good thing for the environment (Lewis, 2003). Although organizations are now implementing sustainability to improve the overall performance of the organization, sustainability still enables organizations to improve the image and reputation and remains one of the structural goals (Esen, 2011; Nousiainen and Junnila, 2008). In order to communicate the improved sustainability performance and thereby enhance the reputation, there is a growing commitment among the organizations to report about the corporate social responsibility in their reports, see paragraph 2.5.2 about the corporate social responsibility reporting. These reports cannot simply claim that the organization is sustainable when stakeholders see that they occupy an unsustainable building. To improve the image and reputation, it is therefore important to have at least minimal sustainability requirements with regard to the buildings.

As the employee costs account for a considerable portion of the organization's operational costs, the image of the corporate real estate buildings are serious elements when retaining and attracting (potential) employees. According to research of JLL in 2008 and Nelson et al. in 2010, the latest generation of employees is more engaged with corporate social responsibility than they were a decade ago. To compete with their competitors, organizations need to attract and commit with their potential and current employees through all channels possible, which eventually means that the sustainability performance of real estate can improve the chances of the organization (Collier and Esteban, 2007).

One of the reasons why employees are more engaged with the sustainability of the buildings is to reduce their influence on climate change. Besides that, there are more direct benefits for the people working in sustainable buildings. Research suggests that certain aspects of a green building can boost the productivity and improve the health and well-being of the employee (Falkenbach et al., 2013, Feige et al., 2013) which eventually leads to less absentee and lost days at the organization (World Green Building Council, 2013). This is caused by the improved indoor air quality that in the course of the time improves the employee health and productivity (Edwards and Naboni, 2013; Linn and Quintal, 2011). It has been suggested that these valuable benefits exceed the costs of implementing sustainability in corporate real estate by a wide margin (Seppänen et al, 2006).

The drivers of sustainability on the corporate level have been part of the literature and it can be argued that the business case on this level has been confirmed. Runde and Thoyre (2010) even stated that sustainability in CREM is no longer a strategy to only benefit from, but it is becoming a threat for organizations when they do not implement it at all. Since sustainability has direct affect on the property value and on business decisions, it is becoming a risk when an organization is ignoring sustainability.

Building level drivers

To integrate social, environmental and economic factors in the corporate strategy, Epstein and Buhovac (2014) state that there is a business case for sustainability performance. In addition, the real estate community has shown interest in improving the performance of properties, as Lutzekendorf and Lorenz (2006) proved that green buildings were gaining momentum. There are many definitions of green building, although the most comprehensive definition is created by Kozlowski (2003):

"Green buildings use a carefully integrated design strategy that minimized energy use, maximizes daylight, has a high degree of indoor air quality and thermal comfort, conserves water, reuses materials and uses materials with recycled content, minimizes site disruptions, and generally provides a high degree of occupant comfort"

However, Sharp and Rives (2009) proved that a green building can cost significantly more to build than a conventional building and commercial real estate managers raise the rents to compensate this difference. A growing number of researchers proved that green buildings can have economical benefits for occupiers, like operational cost reduction and higher productivity (Eichholtz, Kok, Quiqley, 2010). Regarding the willingness of companies to pay a rent premium for green buildings, the results of different studies are sometimes inconsistent. For instance, Gabe and Rehm (2014) argue that office occupiers in Sydney are not willing to pay a rent premium for an energy efficient building, whereas a survey of Wiencke (2013) found that Swiss corporations are prepared to pay up to a three per cent rent premium.

As discussed in paragraph 2.4, the reduction of costs is one of the most important strategies when an organization manages corporate real estate. To accomplish a reduction of occupancy costs, organizations could implement measures that would reduce the consumption of the buildings. Since a substantial amount of the operational costs is caused by the energy and water consumption of the building, improving the energy and water features can reduce these costs substantially (UNEP, 2012). Retrofitting and refurbishing the existing stock offers the most cost-effective solution for reducing energy consumption. The potential reduction of these energy measures is growing rapidly, due to technological development of energy efficiency measures and the tendency that the price of energy will continue to increase in the world.

Sustainable buildings are not more expensive to build from the outset than conventional ones but their ownership can result in clear benefits for investors (Baas, 2013). When organizations own their occupied buildings, energy efficiency measures can be implemented to reduce the operational cost, which can lead to an increased value of the property (Cajias and Piazolo, 2013). In addition, organizations have been more focused on the sustainability performance of the buildings because the physical characteristics contribute to the value of the building (Ellison and Sayce, 2007).

2.3.4 Circle of blame

The literature about the drivers of CRE sustainability proves that the implementation of it can improve the performance of the organization, but there is still a lack in implementation of sustainable features in the building environment. So, why is sustainable development of buildings still not mainstream and are some organizations still not implementing sustainability in their corporate real estate portfolio (Andelin et al., 2014)?

Keeping (2000) stated that the lack of sustainable implementation in the building environment was caused by a "vicious circle of blame". The circle of blame is based on the general attitude towards sustainable development of four stakeholders that operate

on the real estate market. Although each stakeholder acknowledges the benefits of sustainable real estate for their own business, they blame the other stakeholders (figure 12). According to Keeping (2000), this miscommunication caused the implementation of sustainability in the real estate market to slow down during the last decade.
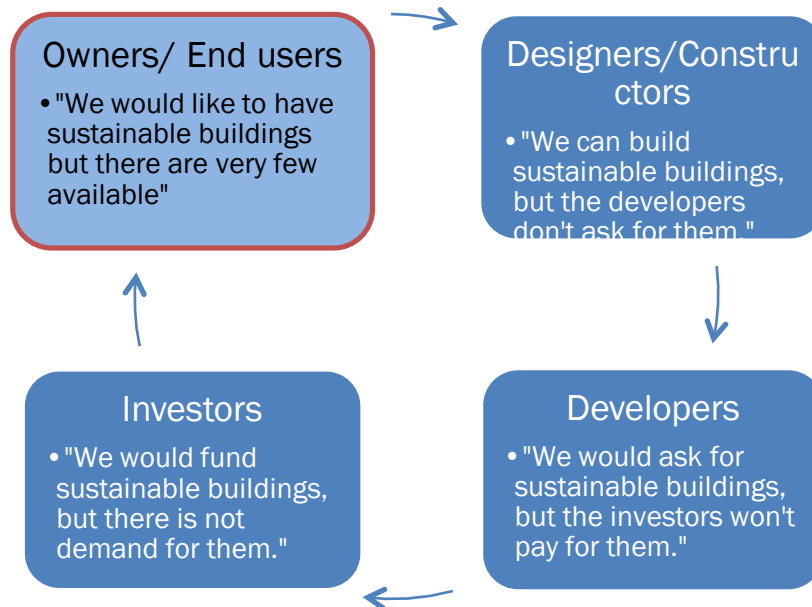
Figure 14: The vicious circle of blame (Keeping, 2000)

The circle of blame tries to explain that the occupiers and end users, organizations with corporate real estate, want to lease sustainable buildings but they think that the commercial real estate investors do not want to invest in such features. On the other hand, real estate investors expect that investments in sustainability do not make a difference, since the occupiers and end users would only prefer to lease buildings with the lowest rents. This causes the designers and constructers to think that the investors and owners/end users are not willing to invest capital in sustainable real estate, which eventually leads to a minimal amount of sustainable developments. This negative circle of thinking has led to the so-called "vicious circle of blame", which could be resolved when the stakeholders communicate their views in a transparent way with each other.

In order to resolve the circle of blame and to turn the process of blame around, Andelin et al (2014) stated that the circle could be changed into a virtuous loop of adaptation in which sustainability would thrive. Their research, based on existing literature and survey results, focused on the drivers of the investors and occupiers in which they indicated the common drivers to implement sustainability in real estate. These were the improvement of the corporate image, culture and the reduction of the operational costs.
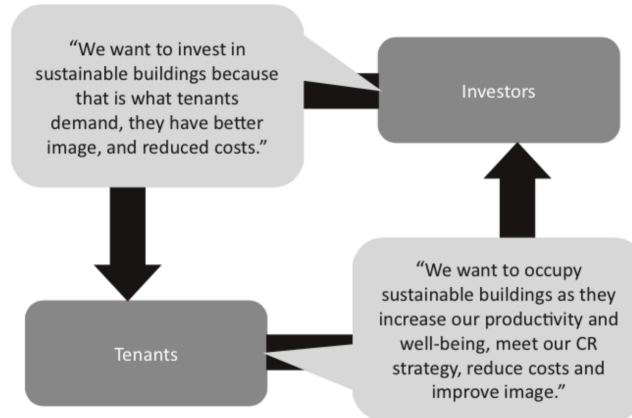
Figure 15: Virtuous loop of adaptation

2.4   Conclusion

Corporate real estate management has become a recognized part of organizations during the last decade. In the beginning, CREM was managed on ad hoc decisions that were based on the current needs of the organization. Nowadays, CREM is a strategic resource to reduce risks and add value to the business operations, as it can affect the ability to achieve the goals and support the strategies of the organization. In the updated model of Lindholm et al. (2012), eight different strategies were defined to maximize the added value of CREM. The eighth new strategy was the supporting role of CREM towards the sustainability performance of the organization. This clearly shows that sustainability is gaining grounds in both the existing literature as in the implementation and reporting of corporate real estate sustainability.

Corporate social responsibility has been used by organizations to refer to the sustainability in general within the organization. Stakeholders can check and see how well the organization is engagement with sustainability in so-called CSR reports. CSR reports include all the sustainability aspects of the organization, sometimes based on the guidelines of reporting standards. Although these standards define how organizations should report about certain CRE aspects, there is still a lack of transparency and consistency in the CSR reports when it comes to the sustainability performance of the CRE portfolio (Laposa and Villupuram, 2010). The research paper of Laposa and Villupuram (2010) is based on a content analysis with a limited amount of variables and only describes how often certain keywords are mentioned in the CSR reports. This paper researches more specifically which indicators the organizations use to describe the sustainability performance of their corporate real estate portfolio.

In the last paragraph of this chapter, the existing literature about sustainability within CREM has been discussed and a definition of CRESM has been adopted (UNEP, 2014):

"Corporate Real Estate Sustainability Management (CRESM) thus refers to the integrated management of all economic, environmental and social aspects of an organisation's property (real estate) activities and associated investment decision-making. It comprises and applies to all relevant strategies, processes and organisational structures that support corporate governance and sustainable business and product development."

In the existing literature, many researchers describe the drivers and barriers of the implementation and reporting of CRESM. These drivers and barriers can be categorized in external, corporate and building levels of implementing sustainability in the CRE portfolio. Although the business case for the implementation of sustainable indicators in CRE has been established, the circle of blame still causes to slow down sustainability in

the real estate sector. The relationship between the investors and the CRE market has to change positively in order to transition from the circle of blame into a virtuous loop of adaptation. This will eventually result in enhanced sustainability performance in the real estate sector.

3. Corporate real estate sustainability indicators

The goal of this chapter is the identification of sustainable indicators used by CREM to implement and report sustainability in the CRE portfolio. These indicators are used as input for the content analysis and the semi structured interviews. First, the stages of organizations when they implement sustainability measures in the corporate real estate portfolio will be described. Then the measurability of sustainability will be part of the discussion, since there are differences between how the indicators are used in CREM. Once these differences have been explained, the actual indicators as described in the literature will be identified. These indicators will be positioned in the different stages of CRE sustainability to get a clear overview of the period of implementation. Finally, there will be a conclusion where the relevant indicators of the CRE sustainability will be discussed. These indicators will eventually be used in the content analysis.

3.1   Sustainability indicators

The indicators of sustainability have not been part of a large amount of literature. The reason of the lack of research in this field could be that even companies with high standards of CSR do not differentiate between corporate real estate indicators clearly (Lucas, 2009), let alone the sustainability indicators within the corporate real estate market. Because of the lack of differentiation and implementation of these CRE practices, Pekar (2013) stated that sustainability of CREM has been slightly inefficient and hard to structure within an organization. As the urgency to define corporate real estate sustainability indicators grew, some researchers have started to define specific indicators for corporate real estate owners.

As CREM still lacks specifically identified measures, Masalskyte et al. (2014) conducted interviews with CRE managers to determine the current sustainable indicators used in corporate real estate management. Figure 14 shows the results of the interviews. Masalskyte et al. (2014) identified the 18 most commonly used CREM indicators at nine organizations in Finland. Since these CREM indicators are the only indicators identified in previous literature, the focus of this paragraph will be on some of these 18 indicators. Three indicators are not taken into account in this paragraph since they are less relevant when an organization reports about their CSR performance or because they overlap with other indicators. Those indicators are 'green office', 'sustainability finance' and 'sustainability unit'.

Water Management	Waste Management	Energy Management	Monitoring and Controlling	Buildings Certification	Sustainability Organisations
Sustainable Facility Management	Green Supplier Chain	Communication with stakeholders	Communication with employees	Green Office	Sustainable Workplaces
Sustainability Unit	Sustainability Finance	LCA , LCC	Environmental Policy	Strategy	Sustainability Benchmarking

Figure 16: Sustainable CREM practices at organizations (Masalskyte et al., 2014)

3.1.1 CRE sustainability strategy

In paragraph 2.4 about the added value of CREM, we discussed the eight possible strategies of corporate real estate management. One of the added strategies in the research of Lindholm et al. (2008) was the strategy to support the sustainability performance of the organization through sustainable management of corporate real estate portfolio. In order to successfully execute a CRE portfolio strategy, CREM needs to be aligned with the business goals (Meulenbroek and Haynes, 2014). CREM needs to understand the business objectives, including the operational objectives, financial goals, brand strategy and obviously the CSR goals. When CREM fully understands these, the CRE portfolio can be analyzed and a specific strategy can be designed that is aligned with the objectives and sustainability goals.

According to the ISSD (2013), the definition of sustainable strategy is as follows: "A sustainable development strategy is a continuing and adaptive process of strategic and coordinated action". For the development of a CRE sustainability strategy, this means that the organizations needs the C-suite of the organization to be committed to sustainability, CREM has to set objectives with an efficient process of measuring, monitor the process and then coordinate the monitoring and improvement of the CRE performance (Beverley, 2013).

3.1.2 Environmental policy

The environmental policy of CRE is the guideline to achieve the sustainable objectives of the organization. The strategy, on the other hand, is about the method of understanding environment and making plan on what needs to be done to achieve the objectives, planning is about making choices about how to use the resources you have and the actions you will take to achieve the choices made in your strategy to achieve objectives.

3.1.3 Energy management

When one thinks of sustainability in real estate, many would refer to the management of the energy in the buildings first. This could be caused by the fact that buildings account for 60 percent of worldwide electricity demand (UNEP, 2014) and 40 percent of primary energy consumption in most countries (IEA, 2014). The energy efficiency of real estate has become more important and has the potential to reduce the operational costs and even more important the impact of an organization on the environment by an influential amount. GRESB (2014) reported that 508 commercial real estate managers reduced their aggregated energy consumption by nearly 0.4 GWh, which is the equivalent of the energy consumption of 25.000 homes.

In the United States, energy efficiency can achieve a reduction of 1.4 trillion dollar by 2050 (Lovins, 2011). Almost two-thirds of the Fortune Global 100 have committed to energy consumption reduction and renewable energy, although less than one third has targets for the energy efficiency, renewable energy generation and the reduction of the greenhouse gasses of their buildings (Ceres et al, 2012). Energy efficiency of buildings can be achieved by implementing efficiency measures, like the well-known LED lighting, or by more meaningful building upgrades, like a heating, ventilating, and air conditioning (HVAC) system or new isolation.

The energy efficiency measures have direct benefits on the reduction of the greenhouse gasses emitted by the building, since the GHG emissions are mainly caused by the consumption of electricity, heat or steam (GHGprotocol, 2014). Many organizations

measure the GHG emissions to be able to compare this data with previous years in order to know how well they are reducing their effect on the environment. The GHG Protocol (2014) made a distinction between direct and indirect GHG emissions: "Direct GHG emissions are emissions from sources that are owned or controlled by the reporting entity and the indirect GHG emissions are emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity." In order to report the GHG emissions in a transparent and consistent manner, the GHG protocol categorized the direct and indirect emissions into three scopes. Scope 1 consists of all direct GHG emissions used in the real estate portfolio. Scope 2 is the indirect GHG emissions from consumption of purchased electricity, heat or steam for the buildings. Finally, scope 3 consists of all other indirect emissions, such as the transport of employees to work.

In order to anticipate on new ways of energy management, organizations, like Walmart, have recently announced their goal to produce the energy of their buildings through renewable energy (Walmart, 2014). This can be achieved by producing the renewable energy on-site or by purchasing renewable energy from external organizations to meet the energy requirements of the building.

The way CREM manages the energy supply and consumption depends on several different variables. The length of hold is one of the key variables, since the energy management needs to adjust to the period each building has left in the CRE portfolio. A short hold is when the building will be occupied for less than five years from now and a long hold is when it is a period of more than five years. The length of hold highly depends on the ownership type of the building, basically whether the building is owned or leased. When a building is leased, the energy management is arranged differently since the tenant needs to work with the landlords to accomplish the energy goals. When the building is owned by the organization, they can decide independently and implement measures at any given moment during the life cycle. The life cycle of the building plays a big role in the management of energy, since the building can be in the operational or non-operational phase. When the building is non-operational, it is either part of an acquisition, refinance or re-lease process.

| LIFE CYCLE | SHORT HOLD | | LONG HOLD | |
	OWN	LEASE	OWN	LEASE
Acquisition, Refinance, or Re-lease	Prioritize efficient buildings with fully digital automation system Talk to mortgage provider about wrapping an investment into the loan	Prioritize efficient buildings with fully digital automation system Require efficiency measures as part of tenant improvement	Prioritize efficient buildings with fully digital automation system Talk to mortgage provider about wrapping an investment into the loan	Prioritize efficient buildings with fully digital automation system Consider operations cost pass-throughs in order to facilitate investment
Operation	Consider financing that is transferable to new owners (PACE, on-bill, ESA)	Implement behavior change and employee engagement programs	Create longer-term energy improvement plan	Work with landlord on longer-term energy improvement plan

Figure 17: Guidance on specific actions for portfolio-wide investment allocation (Bendewald and Miller, 2014)

These three variables have been positioned in a matrix, which shows the relations between them. At each combination of the variables, the matrix recommends specific measures and actions, which should be considered in order to manage the energy consumption of the CRE portfolio actively.

3.1.4 Water management

Since the most relevant improvements and progress can be achieved by managing the energy more efficient, the management of water and waste in CREM has not been part of the literature to a large extent. In some regions where the supply of water is becoming a risk and threat to the operational tasks, organizations have been more aware about the

water management. In California, for example, state laws have regulated the water suppliers to stop the supply until it has been proven that there will be no shortages of water for at least twenty years in order to serve large new real estate developments (Ceres, 2010).

3.1.5 Waste management

The construction and demolition activities are responsible for one third or more of the total solid waste generation, according to UNEP Sustainable Buildings and Climate Initiative (2013). Although the built environment has a huge influence on the environment, reporting on waste by the real estate sector is often limited in scope, accuracy and detail (Epra, 2014). Waste management has been defined by Cossu (2014) as the "generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes".

When an organization reports and manages the waste data actively during several years, it should enhance the identification of opportunities and the ability to manage its reduction. This could also indicate potential improvements in productivity and process efficiency. Eventually waste management can lead to financial benefits, besides the indirect benefit of improved productivity and process efficiency, since the reduction of waste leads to lower costs for the disposal, processing and materials (UNEP, 2014). Information about the disposal destination reveals the extent to which an organization has managed the balance between disposal options and environmental impacts. For example, landfill and recycling create very different types of environmental impacts and residual effects. Most waste minimization strategies prioritize options for recovery, reuse, or recycling over other disposal options.

3.1.6 Monitoring and Controlling

In order to reduce the energy consumption, GHG emissions, water use and waste of CRE, organizations need to know where they stand at the moment by measuring the current influence of these four performance indicators (Temmink, 2010). To measure the potential reduction, organizations need to first monitor and then control these performance indicators. Many companies use environmental management systems (EMS), which include a data management system (DMS) to monitor and control this process.

Since 1993, regulation of the European Union was initiated for the implementation of EMS at organizations. The definition of an EMS is, according to the U.S. Environmental Protection Agency: "An environmental management system (EMS) is a set of policies and procedures that allow an organization to review, analyze, control and reduce the environmental impact of its operations while operating with greater efficiency and control. Implementing an EMS can benefit organizations of all sizes in both the public and private sector. An EMS creates a systematic framework to encourage an organization to improve its environmental performance." One of the most commonly used environmental management systems is the ISO standard. ISO created a family of standards for organizations to monitor and control the environmental consequences. Especially the standard ISO 14001 is used by organizations to set the minimal requirements to control and monitor the performance.

3.1.7 Green building certification

As we discussed in paragraph 2.3 (corporate real estate reporting), organizations can certify buildings in order to label and score the sustainability performance of individual buildings. There came a demand for certifications for buildings, due to the lack of knowledge about which aspects during the lifecycle of a building make a building greener and sustainable. Nowadays, building certifications are more and more used to provide transparent information about the environmental performance to the stakeholders and to eventually positively influence the sustainable decisions of the customers, suppliers and the employees of the organization (Fuerst and McAllister, 2011). The decision of organizations to lease or own a building with a green building certificate can have various other reasons, but the most acknowledged reasons are the improved image of the organization as a whole, reduced risk profile and the buildings tend to consume less energy and resources. The main disadvantage for organizations is that the rents of green buildings are on average three percent higher than conventional buildings (Eichholtz et al., 2013).

Since the inception of the first building certification scheme (BREEAM) in 1990, a wide range of schemes have been introduced in the real estate sector. There are currently around 600 different green building schemes in the world and this amount is still growing (Vierra, 2014). The variety of certification schemes is primarily caused by the different perceptions and specific risks in the regions. Although the certifications schemes became more similar during the last decade, there are still many differences between the schemes in for example the awarded ratings (figure 14) (McArthur et al., 2014). In order to give a better feeling about the current certification schemes, this paragraph will discuss the most commonly used schemes by commercial and corporate real estate managers. These are BREEAM, which is mainly used in Europe, LEED in North America, GREENMARK in South East Asia, BEAM PLUS in Asia and GREEN STAR in Australia.

	BREEAM UK	LEED USA	GREENMARK Singapore	BEAM PLUS Hong Kong	GREEN STAR Australia
RATINGS AWARDED	OUTSTANDING	PLATINUM	PLATINUM	PLATINUM	6 STAR
	EXCELLENT	GOLD	GOLD PLUS	GOLD	5 STAR
	VERY GOOD	SILVER	GOLD	SILVER	4 STAR
	GOOD	CERTIFIED	CERTIFIED	CERTIFIED	3 STAR
	PASS				2 STAR
	UNCLASSIFIED				1 STAR

Figure 18: Difference in ratings between green building certfications schemes (McArthur et al., 2014)

The most well known certifications are BREEAM and LEED, since they have been orientating and adapted on multiple regions around the world. Although LEED was originally created based on the framework of BREEAM, there are some differences between the two schemes. For example, LEED certifies buildings on the basis of different assessment criteria than BREEAM (Figure 17). Since these differences arise from their backgrounds and adaptation to the specific regions, one cannot favor the different schemes over the other (Rezaallah et al, 2014). This should be decided based on the regional conditions and background of the buildings in question, although LEED is growing rapidly in global popularity and remains the preferred accreditation among US occupiers and investors (Cushman & Wakefield, 2008).

Assessment criteria	BREEAM	LEED	CASBEE	Green Star
Energy	☑	☑	☑	☑
CO_2	☑			
Ecology	☑	☑	☑	☑
Economy				
Health and wellbeing	☑		☑	☑
Indoor environmental quality	☑	☑	☑	☑
Innovation	☑		☑	☑
Land use	☑	☑		
Management	☑		☑	☑
Materials	☑		☑	☑
Pollution	☑	☑	☑	☑
Renewable Technologies	☑	☑		☑
Transport	☑	☑		☑
Waste	☑			
Water	☑	☑	☑	☑

Figure 19: Differences between assessment criteria of certifications (Haynes and Nunnington, 2010)

As figure 17 shows, all building certification schemes cover the energy efficiency aspect of buildings. Since energy efficiency is an important aspect, governmental bodies have developed energy performance certificates (EPC) besides the more extensive green building certificates. As discussed at the external drivers of sustainability (Paragraph 2.6.3), EPC's have become mandatory in many countries in the European Union. These EPC's provide building owners and operators with information about how their building compares to similar buildings and to give insight in the potential to improve the energy performance in the building.

EPC's provide energy labels to buildings based on the energy performance in numerous variables, like the use of heating, lighting and cooling. These labels are mandatory and needs to be handed over when a building is acquired, leased or sold. This prerequisite for landlords, allows occupiers to compare the energy performance of buildings against similar buildings and negotiate the difference of the occupancy costs in a more transparent way. Unfortunately the awarded labels in the EU countries are, like the different green building certification schemes, based on different criteria and label classes (figure 18 Thus corporate real estate managers can only compare the EPC labels of their buildings within the same country.

Information on the certificate	AT	BE (Flanders)	CZ	DK	FR Res.	FR Non-res	DE	HU	IE	NL	PL	PT	ES
Label classes	A++ A+ A B C D E F G	No (sliding scale)	A B C D E F G	A B C D E F G	A B C D E F G	A B C D E F G H I	No (sliding scale-indicator without classification)	A+ A B C D E F G	A1A2A3 B1B2B3 C1C2C3 D1D2 E1E2 F G	A++ A+ A B C D R F G	No (sliding scale-indicator without classification)	A+ A B B- B C D E F G	A B C D E F G
Performance indicator	kWh/m²a	kWh/m²a	GJ/year	No specific info	kWh/m²a		kWh/m²a	No specific info	kWh/m²a and CO_2 emission	Energy index	No specific info	kWh/m²a	No specific info

Figure 20: Information on the basic EPC content for the 12 EU member states (BPIE, 2014)

3.1.8 Sustainability organizations

According to a study of the UN Global Compact and Accenture, 93% of the CEOs see sustainability as important to their organization's future success. Organizations are trying to improve the performance of the company at every aspect of the organization, and corporate real estate can be of huge influence. Although the approach to embed sustainability in the processes of the organization is essential, this indicator is not closely related to corporate real estate and will not be part of further discussion.

3.1.9 Sustainable facility management

Facility management in the environmental strategy of an organization gained an important role in organizations (Junnila, 2004; Hodges, 2005). Since the employees are often working in a facility, sustainable facility management can have a huge impact on possible improvement of the efficiency. Almualim et al. (2010) claims that facility management has not reached its full potential to support the sustainability performance of organizations, which is caused by time constraints, lack of knowledge and lack of senior management commitment. Beside that, they claim that the undervaluation of the FM role in general is the main reason of the lack in achieving sustainable facility management.

3.1.10 Green supply chain

A supply chain is a collective term for all elements included in the sourcing, production and distribution of products and services. Researchers have defined supply chains as 'the integration of key business processes from end-user through original suppliers that provide products, services, and information that add value for customers and other stakeholders' (Lambert et al. 1998, 2006).

It is becoming obvious that the most significant environmental and social impacts of companies occur beyond their internal operations, through their upstream and downstream supply chains. These impacts include the upstream environmental and social impacts of their suppliers, as well as the downstream impacts that occur through the use and disposal of their products and/or services. Because these impacts occur beyond direct, internal operations, many companies mistakenly do not take any responsibility of their direct and indirect impacts. It is important to mention that a sustainable supply chain seizes value creation opportunities and offers significant competitive advantages.

As the real estate sector creates demand for construction materials, logistics and transport, packaging, and waste management, the sector and its supply chain contribute

to consumption and production patterns which impact key environmental and social aspects such as carbon, energy, water, waste, labor rights, and health and safety. Upstream, the real estate sector depends on materials, suppliers and contractors. Downstream of the real estate sector are landlords, property developers, property managers and public housing authorities managing multiple buildings typically in local or regional markets.

3.1.11   Communication with stakeholders

Reporting of the CSR performance to the stakeholders has already been discussed in paragraph 2.5.2. Communication of the sustainability performance is in most cases done by the publishing a publicly available CSR report. CSR reports are available for all stakeholders, from investors to customers. Besides the communication via CSR reports, initiatives from organizations have been focusing on the direct community, which are the people living in the areas that are economically, socially or environmentally impacted by the operations of the organization. Community engagement refers to the interaction between the entity and the community.

3.1.12   Communication with employees

Organizations often have created policies and set goals to make the employees more aware of the impact they have on sustainability. The CSR reports of an organization often include indicators about the performance of the employees. Besides the reporting, communication with employees can also be via more practical solutions like signs to be more conscious of the use of paper or water in the toilet.

3.1.13   Sustainable Workplaces

Greene, Myerson & Puybaraud (2012) investigated the different cultures of workplace sustainability at large organizations. The research claims that there are four different types of approaches within organizations to make the workplace more sustainable. These approaches are based on the beliefs of the organization and employees about the relative costs to them. Pragmatists think that only low costs of organization and employee are sufficient to initiate valuable difference in the workplace. These initiatives are for example an update of the lightning to improve the energy efficiency with minimal costs. The libertarian thinks of sustainability as an effort solely of the company and it should not lead to higher costs of the employee. Housekeepers and campaigners are both depending on higher costs and efforts of the employees. Ultimately the campaigner initiates the most viable and realistic plan for organizations, which are committed to sustainability in the daily operations.
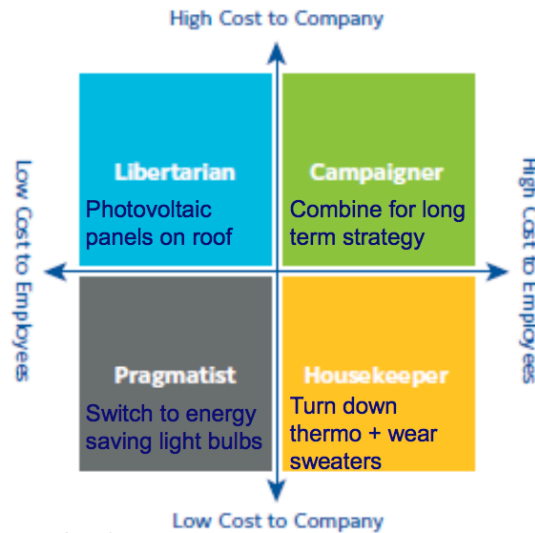
Figure 21: Four different approaches of sustainable workplaces (Myerson & Puybaraud, 2012)

A sustainable workplace can also refer to how employees use the occupied space. Organizations have tried to reduce the occupational space of the workplace during the last decade, as Elefante (2007) stated that the greenest buildings are the ones that already exist. A sustainable workplace tends to use the optimal space to execute business operations, but with efficiency in mind.

3.1.14   Life cycle assessment

Sustainability should be approached as an integral component in the management of the CRE portfolio, and should be integrated at all stages of the building life cycle. Life cycle assessments (LCA) look at the environmental impact of the building during all stages of the life cycle, from the extraction of the raw materials to the demolition of the building. A LCA provides transparent data on which the organization possibly bases the decision to add a building to the CRE portfolio. According to the ISO 14040, the LCA framework should first determine the goal and scope of the LCA. When the goal and scope of the assessment are decided, the inventory of the life cycle can be determined. Based on the materials and processes in the inventory, the impact of the assessment can be analyzed by grouping, normalizing and weighing the data. Finally CREM can analyze the data and make their interpretations.

3.1.15   Green leases

The content of lease contracts is the starting point for the relationship between the landlord and the tenant, and defines both parties' respective rights and duties. The lease contract can be a possible driver or bottleneck to implement sustainability in the corporate real estate portfolio, due to the vicious circle of blame in the real estate sector. It depends on the relationship and trust between the owners and occupiers of the building if the lease contract influences the sustainability performance in a positive or negative way (BBP, 2013). The green leases are intended to encourage constructive collaboration between landlord, occupier and building manager to enhance workplace efficiency and productivity, reduce turnover and help deliver high-performance buildings. Effective green leases include aspects like the sharing of energy, water, waste data, working together to achieve better efficiency and implementation of efficient measures in the building.

3.1.16 Sustainability benchmarking

Benchmarking the sustainability performance with peers to evaluate and have a reference point about the current efforts and performance of the CRE portfolio. There are initiatives in the real estate sector to benchmark and measure the overall performance of the commercial real estate portfolio. GRESB assess the sustainability performance of real estate owners and provides them with the benchmark results compared to their peer group. The participating companies can use this data to improve their sustainability performance and communicate the overall sustainability performance with their shareholders. Such a benchmark has not been released for corporate real estate managers.

3.2   Generic sustainability maturity model for CREM

Based on the sustainability maturity model for organizations, the interviews and the 18 identified sustainability indicators, Masalskyte et al. (2014) created a tailor made 'sustainability maturity model' for CREM. The sustainability maturity model is not applicable for all CRE portfolios and should only be used for a general approach when sustainability is implemented in the specific CRE portfolio.

The sustainability maturity model consists of five levels, from implementation on the level of a single asset to the CRE portfolio level. To achieve full implementation of sustainability in the CRE portfolio, CREM needs to go through five steps; recognize and minimal compliance, plan and initiate, measure and manage, integrate and improve and finally optimizing and innovation. In order to reach a new level of maturity, the suggested indicators of the previous levels need to be implemented or executed in the CRE portfolio. These five levels have been arranged in the three aspects of the more frequently mentioned and used triple bottom line; economic, environmental and social. On the vertical axis, the focus areas of CREM are positioned which are the resources, processes, commitment, communication, finance and strategy.
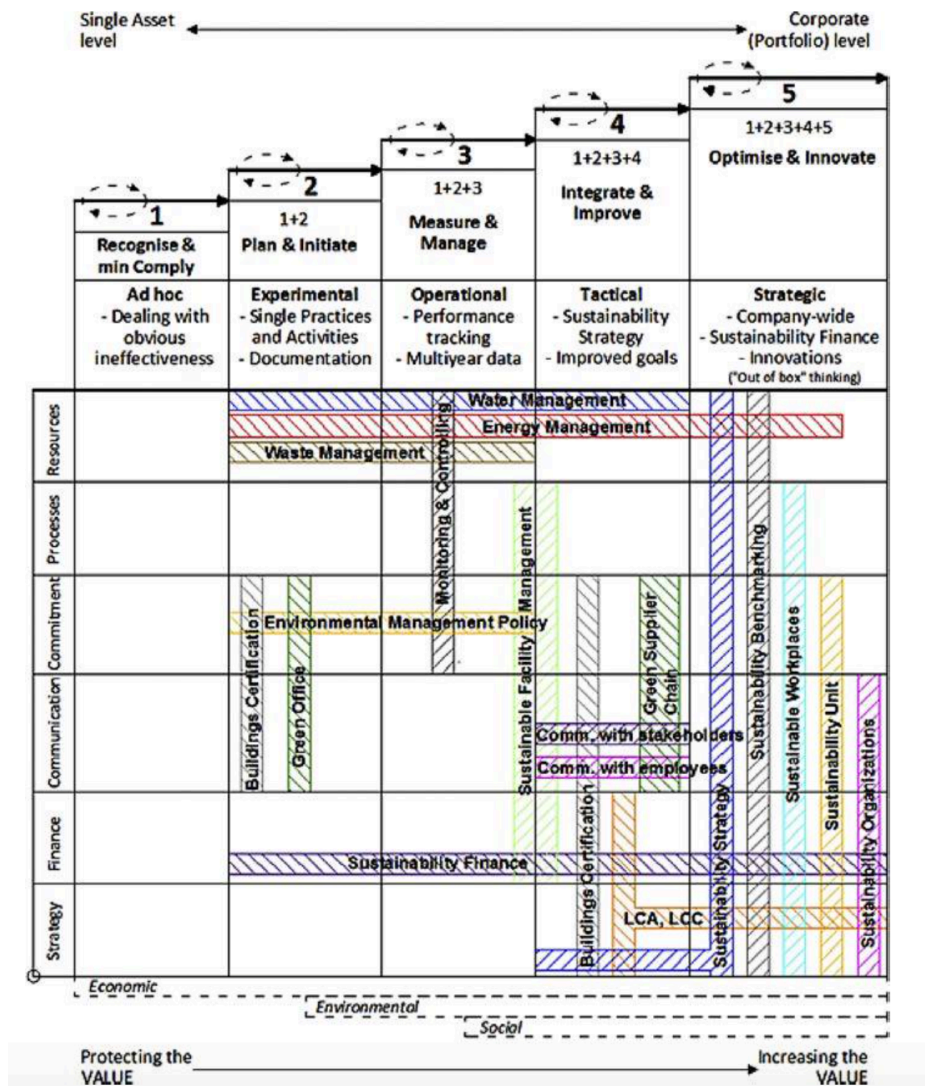
Figure 22: Generic sustainability maturity model for CREM (Masalskyte et al., 2014)

Recognize and minimal compliance
In this phase, CREM decisions only are made when the CRE portfolio has direct negative influence on the core business of the organization. The CRE portfolio is then managed on an ad hoc basis in which the sustainability indicators are left out of the scope. CREM is only focused on the economic drivers of the real estate portfolio. Organizations in this phase do not see and use the full potential of the buildings.

Plan and initiate
When organizations realize the benefits of managing the CRE portfolio more actively, they enter the 'plan and initiate' phase. During this phase, organizations experiment with the sustainability indicators of CREM. Most common practice is that the organizations concentrate on the management of the resources consumed by the CRE portfolio. The potential gains when water, energy and waste management is initiated, is part of the discussion to reduce the operational costs and environmental impact of the buildings. Another commonly used indicator is by certifying the buildings with an energy label and/or green building certificate (see paragraph 3.1.7). These certifications are implemented in an early stage in order to indicate and indirectly communicate that the organization is committed to sustainability in general.

This phase can be fully implemented when the organization sets up sustainability objectives for the CRE portfolio. These are stored in the environmental management policy and should be updated regularly. The environmental management policy keeps CREM committed during the other stages of implementing sustainability.

Measure and manage
According to Temmink (2010), the sustainability performance of CREM should first be measured and managed to eventually develop an effective strategy. Monitoring and controlling the performance is the main point of focus during this stage. This can be achieved by implementing an environmental management system. When CREM has tracked the environmental performance during a longer period of time, analysts can deduce if the environmental management policy is still applicable or needs adjustments.

When the data is analyzed, CREM can better coordinate which individual buildings are not sustainable and need more attention to achieve a certain standard compared to the CRE portfolio. Sustainable facility management can be a measure to improve the sustainability performance of the specific building. The local facility manager can take measures to reduce the impact of the building on the environment.

Integrate and improve
When the operational stage is successfully incorporated, CREM should integrate and continuously improve the sustainability strategy and objectives of the organization. This can be accomplished by formulating the sustainability strategy of CREM, which should be aligned with the CSR strategy of the organization to be effective. The strategy and sustainability performance of the CRE portfolio can now be communicated and published in the CSR reports.

Optimize and innovate
Sustainability is now implemented in all areas of the organization and to keep the sustainability performance optimized, new and existing measures need to be innovated. The strategy is still the leading indicator to align the CREM with the corporate strategy and objectives in this stage, although CREM can concentrate on the sustainability of the workplace and benchmark its performance against a peer group. When all indicators are managed on a strategic level, the added value of CREM for the organization is maximized, which is visualized in the bottom of the model.

3.3 Conclusion

Although CREM has acknowledged the importance of supporting the CSR performance of the organization, literature has not described the sustainability indicators used to implement sustainability in the CRE portfolio to a large extent. The research of Masalskyte et al. (2014) has identified 18 sustainability indicators by conducting 9 interviews at sustainable Finish organizations. These indicators vary significantly across the different industry groups, as the corporate objectives and strategies are diverse. Although these differences, Masalskyte et al. (2014) tended to create a generic sustainability maturity model for CRE executives. This model describes the five subsequent stages of CREM when sustainability is implemented in portfolio. The described indicators in this paragraph show that corporate real estate managers are still in the process of interpreting which indicators are the most useful and add the most value to the organization and in the end to the shareholders. This can be explained by the diverse portfolios of the interviewed organizations, which states the complexity of determining the most desired approach to implement and report the sustainability performance of the corporate real estate portfolio.

In chapter 2, the basic principles of CREM and sustainability have been discussed. Corporate social responsibility reporting and the sustainability performance of the CRE portfolio are discussed. Although reporting standards provide guidelines about how organizations should report about the sustainability performance of their CRE portfolio, Laposa and Villupuram (2010) claim that CREM is not included in a transparent and consistent way in the CSR reports. Research of Laposa and Villupuram (2010) only concentrated on four variables of CREM and how often these variables were mentioned in the CSR reports. Based on the content analysis of 48 reports, they concluded that sustainability of the CRE portfolio is not mentioned transparent and consistent enough. Besides these four CRE variables, the sustainability indicators used by CREM have not been part of their research paper.

To understand why organizations are not reporting in a transparent and consistent way about the CRE portfolio in their CSR reports, the drivers of CREM to implement sustainability in the portfolio are reviewed in paragraph 2.3.2. Although there are several positive drivers to implement sustainability, the circle of blame has to shift to a virtuous loop of adaptation first.

In order to analyse which indicators are used in CSR reports, the currently known and used sustainability indicators of CREM have been discussed in more detail. To get a better understanding which indicators are currently used in CSR reports, it would be interesting to conduct a more extensive content analysis of CSR reports and research if there are differences between the characteristics and location of the organization and the amount of assets on the balance sheet.

4 Research design

This chapter outlines the process from how the previously gathered literature contributes to the approach of the research and how the research is set up to answer the research questions. The relation between previous chapters will be discussed in the recapitulation, followed by describing the two research methods and the data collection. Finally the validity of the research is described.

4.1 Gap in the literature review

In chapter two, CREM and CSR have been part of the review and eventually both topics were combined in the paragraph about corporate real estate sustainability management. The CRE sustainability indicators used by corporate real estate managers are identified and explained in chapter 3, but this has not been linked to the reporting of these CRE sustainability indicators in CSR report and the implementation of sustainability in the corporate real estate portfolio of organizations.

CSR reports include all the sustainable aspects addressed by the organization, sometimes based on the guidelines of reporting standards. These standards define how organizations should report about certain CRE aspects, but there is still a lack of transparency and consistency in the CSR reports when it comes to the sustainability performance of the CRE portfolio (Laposa and Villupuram, 2010). The research paper of Laposa and Villupuram (2010) is based on a content analysis with a limited amount of variables and only describes how often certain keywords, like properties and real estate, are mentioned in the CSR reports of 49 companies. This research paper concentrates more specifically on which indicators the organizations use to describe the sustainability performance of their corporate real estate portfolio. Besides that, the relevant characteristics of the organizations will be analysed and trends within certain regions, industry groups and market capitalization will be uncovered.

In addition, the existing literature has only concentrated on one specific topic of corporate real estate sustainability management. In order to connect the reasons and barriers to implement and report sustainability indicators, this research paper will study the motives of corporate real estate managers. The reasons of organizations to report these indicators will be explored by conducting semi-structured interviews with CRE managers. These interviews will provide this thesis with more insights about the drivers between the implementation and reporting of sustainability indicators and what the reason is of a possible mismatch.

4.2 Research methods design

As previously discussed, the research is based on two different research methods, the content analysis of CSR reports and the semi structured interviews with CRE managers. The research methods used for these analyses are completely different, since the content analysis is based on quantitative research and the semi-structured interviews are qualitative by nature.

4.2.1 Content analysis of CSR reports

Sustainability indicators used in the CSR reports are analysed by conducting a combination of a content analysis and going through the CSR reports by hand, as it was

impossible to use software to identify if the identified indicators were relevant to the corporate real estate portfolio of the organization. The variables used in the content analysis will be discussed first and then the structure of analysing the CSR reports manually will be explained.

The population of the content analysis are the largest organizations in the world as these organizations can have the biggest influence on the environment through their corporate real estate portfolio. The threshold of the population has been set on a minimal annual revenue of 230 trillion. Therefore the population of the content analysis consists of 500 organizations. A sample of 200 organizations has been part of the content analysis, which is a representative sample for the examined population.

A content analysis is defined by Tipaldo (2014) as: *"A wide and heterogeneous set of manual or computer-assisted techniques for contextualized interpretations of documents produced by communication processes in the strict sense of that phrase (any kind of text, written, iconic, multimedia, etc.) or signification processes (traces and artefacts), having as ultimate goal the production of valid and trustworthy inferences."* The content analysis in this research thesis is executed by using the software of Nvivo. The Nvivo software is computer assisted quantative data analysis software, which helps people to manage, shape and make sense of unstructured information in reports. Although the Nvivo software thoroughly scans through the CSR reports and records how often a variable is mentioned in the CSR reports, the analysis does not make a distinction between randomly mentioned words which are the same as the variables or not related to the corporate real estate portfolio. Therefore, the recorded variables are checked manually after the analysis with the software, to make sure a corporate real estate sustainability indicator was mentioned.

Some of the variables have been checked in a structured way by going through the CSR reports. These variables were not analysed with the software, as the software would not be able to analyse them in a consistent way. The CSR reports have been checked separately on the fact if the CRE sustainability indicator was described or mentioned, and did not make a distinction in the quality of the information or data provided by the organization. When the sustainability indicator was identified during the analysis of the software or by checking the CSR reports, the variables would indicate this with the number 1. When the indicator was not included related to the corporate real estate portfolio, the indicator would receive a 0. When the CRE sustainability indicators are identified and recorded, a logistic regression is used to predict the binary data based on the independent variables. The independent variables will be discussed in paragraph 4.3.2, which have been identified in the literature review.

4.2.2 Semi structured interviews

The semi structured interviews will be conducted to support the findings in the content analysis and to answer the research question: "Why do organizations report about the sustainability of their corporate real estate portfolio and is that consistent with the indicators which have been implemented in the CRE portfolio?" Since none of the previous literature described the reasons of organizations to report about the sustainability performance of the CRE portfolio, semi structured interviews will be used to prepare the discussion topics beforehand, but also to keep flexibility to ask additional questions about the relevant topics during the interview. According to Schensui et al. (1999), the definition of a semi-structured interview is: "semi structured interviews consist of predetermined questions related to domains of interest, administered to a representative sample of respondents to confirm study domains, and identify factors, variables, and items or attributes of variables for analysis or use in a survey." It can be

used to explore the attitudes, values, beliefs and motives of the corporate real estate managers of the organizations (While, 2015).

The semi-structured interviews will be conducted with experienced corporate real estate managers, which are part of a large organization in the Netherlands. The CRE managers have been selected based on publicly listed Dutch organizations, which cover all industry groups used in the logistic regression of the content analysis. The invitation to participate in the interview was send to 36 organizations of which 8 organizations were willing to participate in a semi-structured interview.

4.3   Data collection methods

As discussed in the previous paragraph, the data will be gathered differently as the two research methods are completely disparate by nature. The data used in the content analysis is CSR reports of large public organizations. The semi-structured interviews will be conducted at Dutch listed companies. This paragraph will describe the data collection for the content analysis and how the data during semi-structured interviews was coded.

4.3.1 Content analysis

The scope of the content analysis is focused on the "fortune 500 global" list of 2014, which is an annual ranking based on the revenue of organizations. These organizations have an immense influence on the environment and are likely to lease and own large-scale CRE portfolios to execute their core businesses. Besides the impact of their CSR performance, the likelihood that these organizations published a CSR report to communicate their sustainability performance to their stakeholders is much higher than smaller organizations. The fortune 500 global companies represent 17 industry groups and are located mostly in the Asia-Pacific, Europe and North American regions.

The CSR reports are collected from the websites of the fortune 500 global organizations. The websites of the organizations are checked on the availability of a publicly published CSR report. As CSR reports are published annually and to collect recent data, only organizations that published the CSR report after 2012 will be part of the analysis. Nine organizations did publish a CSR report, but these were out-dated and excluded from the content analysis. Three CSR reports are excluded from the data, as they were not available in English.

Not all identified CRE sustainability indicators are part of the content analysis as some of the indicators are not applicable or relevant to publish in CSR reports. The environmental policy for corporate real estate is not analysed, since the environmental policy is an internal policy to reduce the environmental impact of the organization and is therefore less relevant for organizations to publish in their CSR reports. In addition, the communication with stakeholders and employees cannot be checked as an indicator in CSR reports as the CSR report is the channel to communicate the CSR performance with the stakeholders and the employees. The availability of a CSR report on the public website of the organization does imply that the communication does exist and could be seen as an indicator of communication.

The relevant and quantifiable variables are selected based on the literature study and knowledge about which CRE sustainability indicators organizations should report on in their CSR reports. These indicators are presented in figure 21 and the textual queries are selected to identify the indicators in the CSR reports via the Nvivo software (appendix 2). When the textual queries were found in the CSR report of an organization, it is essential to check whether the textual query refers to the CRE sustainability indicator. If the textual

query is relevant to the corporate real estate portfolio, the existence of the CRE sustainability indicator is proved and the dataset indicates the existence via a binary code. The quality of a couple CRE sustainability indicators in CSR reports has not been part of the content analysis, as this would induce arbitrary and inconsistency during the analysis.

Energy management •Energy consumption •Renewable energy •Targets	GHG emissions •GHG emissions •Targets	Water management •Water consumption •Targets
Waste management •Amount of waste •Targets	Monitoring and controlling	Building certifications (case study or portfolio level)
Sustainable facility management	Sustainable workplaces	Life cycle assessments
Community engagement	Green leases	

Figure 23: CRE sustainability indicators analysed in the content analysis

When the Nvivo software identified the sustainability indicator, the relevance is verified and for the "building certification" indicator the scope of reporting was identified as it often occurs that organizations report on a different level in the CSR reports. Organizations can only report about one building (often the sustainable headquarters) in their CRE portfolio that was certified with a high sustainability label, but this does not provide the stakeholders of the organization with transparent or comparable information about the overall performance of the CRE portfolio. When the "building certifications" indicator was identified during the content analysis, the scope of the reporting data was also taken into account. The scope of the building certifications is divided in single building certification cases or the organization reported the certified percentage of the CRE portfolio. The difference is shown in figure 22.

15% of global real estate portfolio LEED certified

72%

These features allow the store to operate on an estimated 34 percent less energy than a conventional store, and it earned LEED Silver certification from the U.S. Green Building Council. The annual savings from LED lighting

Figure 24: Difference between two organizations (Citigroup, 2013 and Walmart, 2014) reporting about building certifications in their CRE portfolio

When an indicator like the green leases is identified in a CSR report, the indicator should be focused on the green leases with the landlords of their corporate real estate portfolio. Depending on the industry group of the organization, the indicator can refer to the lease of a building in the CRE portfolio or to the core businesses of the organization to help or

support the process of issuing green leases. It is therefore essential to check whether the indicators are relevant for the sustainability performance of the CRE portfolio.

The energy, water and waste management of the CRE portfolio are separated in multiple variables, as these indicators are wide-ranging. The energy management is divided in the energy consumption of the CRE portfolio, renewable energy generated at the buildings and if the CSR report mentions the energy targets of the CRE portfolio. Since organizations often report the greenhouse gas emissions of the organization, the GHG emissions of the CRE portfolio and targets are analysed as well. The water and waste management indicators have been analysed by identifying the water consumption and the amount of waste used at the buildings.

In addition to the indicators that are examined by the Nvivo software and checked afterwards on CRE relevance, some of the indicators are analysed by going through the CSR reports separately. The CRE strategy of organizations could not have been analysed by the other method as each organization mentions the strategy in a different fashion.

4.3.2   Independent variables in content analysis

The CRE sustainability indicators used by organizations in CSR reports can depend on several other elements of an organization. Masalskyte et al. (2014) showed that the industry group in which an organization operates influences the sustainability measures implemented in the CRE portfolio. According to GRESB (2014), there are regional differences between the sustainability performances of real estate investors. One could also argue that size of the organization could influence the indicators reported and therefore the market cap and amount of employees are selected as independent variables. Finally, the data collection of the property, plant and equipment compared to the total assets will be discussed, as this independent variable gives an indication of the percentage of corporate real estate owned by the organization. Organizations with a relatively high percentage of owned buildings in the corporate real estate portfolio should be more aware of the possible impact of their corporate real estate on the environment. To report the performance of the CRE sustainability indicators can potentially and should have a higher urgency for these organizations. The independent variables will be discussed in further detail and how the data was collected.

Industry group
Masalskyte et al. (2014) proved that the CRE portfolio is managed differently in the different industry groups and that specifically sustainability measures are implemented differently in the corporate real estate portfolio. Based on the differences between the industry groups when sustainability measures are implemented, it would be compelling to analyze the influence of the industry group on the sustainability indicators reported in the CSR reports. Hence the industry group of the organizations is a independent variable used in the logistic regression. The organizations are assigned to one of the seventeen industry groups mentioned by the Fortune 500 global list (Fortune, 2014).

Regions
The regional differences of the organizations can influence the indicators they use to report, since regulations differ substantially in the regions. The European Union, for example, has mandatory regulations in place to certify all commercial real estate properties with an energy performance certificate (EPC). This independent variable will show us if these regulations influence the way organizations report about their CRE portfolio. The region are based on where the organizations started their business and is not based on the allocation of the buildings in the CRE portfolio. Although most of the organizations still operate in buildings of the region they started, some organizations are globally positioned.

Market capitalization
The market capitalization is the total market value and expresses the size of the organization. As previously discussed, organizations of a certain size are almost obliged to disclose the sustainability performance as the impact of the organization is high compared to companies of a smaller size. The independent variable has been included in the analysis to verify if organizations of a certain size report more and transparent data about the CRE portfolio in the CSR reports. The market capitalization

Employees
The amount of employees could be an incentive for organizations to implement sustainability in the CRE portfolio, as the building in which employees work can have positive effects on the productivity, health and wellbeing. To examine if the amount of employees influences certain CRE sustainability indicators, the amount of employees will be part of the logistic regressions.

Ratio of PPE to total assets
Property, plant and equipment on the balance sheet refers to the assets, which are necessary to carry out the business operations, but are not easy to liquidate. The PPE assets typically consist of the land, facilities, machineries, office equipment, vehicles, furniture and fixtures owned by the organization. Although only the land, facilities, office equipment and furniture relate to the value of the corporate real estate portfolio, the ratio of PPE to total assets gives an indication of the value of the owned corporate real estate buildings. When an organization has a high percentage of PPE compared to the total assets, one could argue that it is more likely that they report about CRE sustainability indicators in the CSR reports. The data is collected from the annual reports, which were published during the same year as the CSR reports of the organizations.

4.3.2 Semi-structured interviews

The semi-structured interviews are conducted at publicly listed organizations in the Netherlands. Only publicly listed organizations are selected for the semi-structured interviews, since the results of the interviews can then support or clarify the findings of the content analysis which is also focused on listed organizations. The interviews were conducted at organizations in the Netherlands, as this would be more convenient for the interviewer to conduct the interviews in person.

The organizations were selected on the basis of a sample, which would represent all industry groups identified for the content analysis. The interviewees can act as experts of the particular industry group and discuss the implementation and reporting of sustainability in the corporate real estate portfolio. As sustainability is implemented differently in the CRE portfolio across different property types, the differences between the interviewed experts can contribute to a better understanding of why the organizations implement and report sustainability.

Script of the interview
The script of the interview is divided into two sections. The first section was sent beforehand to the interviewees with questions about the CRE portfolio characteristics. This section contained detailed questions about the composition and sustainability strategy of the organizations, which would need internal research. The interviewee is asked what the distribution of the leased and owned part of the CRE portfolio is. This is also part of the content analysis and could support or weaken the results of the content analysis. Considering the differences between the management of the property types, the interviewees are asked which property types they have in their CRE portfolio. This

composition can differ between office, industrial, warehousing and retail space, or generally a combination of these. The size of the CRE portfolio is asked in square meters, as this affects the achievable impact on the environment. When the CRE portfolio consists of a relatively high total square footage, the importance to reduce the environmental consequences through CREM could be higher. The main driver of the organization when managing the corporate real estate portfolio is asked to examine how this affects the approach of implementing or reporting the sustainability. The final queries of the interview are focused on what sustainability means within the organization and how they would define sustainability. As paragraph 2.3.2 mentioned, the definition of sustainability is broad and can be interpreted contrarily at the organizations.

The second part of the interview script was conducted in person at seven out of eight interviews. The interview with the corporate real estate managers of the merged organizations, Ziggo and formerly UPC, was conducted by phone. After the introduction and shortly going though the first part of the interview, the questions of the semi-structured interview were part of the conversation. The structure of the second part of the script has a top down approach through the organization. It starts with questions about how sustainability is incorporated in the management of corporate real estate and what the reasons of the organization are to implement sustainability. Then the differences between the ownership of the buildings are highlighted, since the approach towards sustainability can vary to a large extent between leased and owned buildings. The interview continued with questions about how the CRE manager implements sustainability and measures the performance of CRE sustainability indicators used. The CRE sustainability indicators emerged during the interviews can enhance the list of indicators described in the literature review. When the corporate real estate managers identified the indicators, the interviewer asked if there were any barriers and what the barriers were when implementing them.

When the questions about the implementation were finished, the interview moved towards the communication of the CRE manager with stakeholders about the performance of the CRE portfolio. The focus of these questions was on the interaction between the CRE sustainability indicators implemented and how the CSR report disclosed the indicators. This was executed by going through the relevant parts of their CSR report where the CRE sustainability indicators were mentioned. The final part of the questions was about the possible difference between the implemented indicators in the CRE portfolio and the reported indicators in the CSR report. This information could provide the research with a better understanding of the importance and bottlenecks when organizations report the sustainability performance of the CRE portfolio.

4.4   Data analysis

After the data in the CSR reports was collected, it was analysed by using a descriptive analysis and after that logistic regressions. After conducting the semi-structured interviews, the data was coded. These data analysis methods will be discussed in this paragraph.

4.4.1 Descriptive analysis
The descriptive analysis of the data collected in the content analysis is focused on the characteristics of the organizations. It will describe the representation of the industry groups, geographical distribution, amount of employees and the ratio of property plant and equipment to total assets. The homogeneity of the sample is controlled in order to draw viable results. The details of the corporate real estate managers that participated in the interviews will be described.

4.4.2 Logistic regression
Due to the fact that only the presence of the CRE sustainability indicator was checked and not the quality of it, the data analysis used to analyse the data were logistical regressions. The logistic regressions are used to predict the binary outcomes of the content analysis based on the independent variables, which are the characteristics of the organizations in this analysis. The dependent variables are based on the presence of the CRE sustainability indicator in the CSR reports, which are binary as the number of available categories is two (0 or 1). The logistic regression measures the significance of the relation between the dependent variables and the independent variables. The logistic regression models are shown in appendix 3.

In order to interpret the results of the logistic regression models, the following steps are executed. First the magnitude of the relations was determined. The magnitude is based on the odds ratios and the p-values in the model. The odds ratios in the first column of the logistic regression tables present the direction of the relation between the independent variable and the reported CRE sustainability indicators. When the ratio is close to zero, the direction is negative. When it has a higher ratio than 1, it refers to a positive relation between the independent variable and indicator. If the positive or negative relation is significant, depends on the p-value. The p-value indicates if the logistic regression was statistical significant.

The process of interpreting the magnitude and significant relations is as follows. The statistically significant variables were marked in a matrix of the results. Then these variables were organized in two lists of positive and negative associated relations. These relations were then translated to an overview with the positive(+) and the negative(-) influences of the independent variables on the reported CRE sustainability indicators.

4.4.3 Analysis of qualitative research
Some of the data retrieved during the interviews is coded to categorize the data in a systematic way and to analyse the patterns in the interviews. The CRE sustainability indicators implemented in the CRE portfolio were analysed and compared against the indicators disclosed in the CSR report of the organization. Besides this comparison, the answers given in the interviews are used to describe how the organizations in that industry group struggle to implement and report about the sustainability indicators in the CRE portfolio.

4.5 Validation

The internal and external validity of the analyses will be discussed in this paragraph. The internal validity describes how thoroughly the data collection and analysis were executed. The external validity refers to how the research results can be generalized for larger groups.

Internal validity
The content analysis tries to identify which CRE sustainability indicators are used in the CSR reports of organizations. The indicators have been recognized in a systematic way, using software and checking the relation with the CRE portfolio. As only the presence of the indicator has been checked and not the quality of the reported indicator, it should be possible to replicate the analysis and check the results. However, the judgement whether or not the indicator was related to the corporate real estate portfolio was hard to predict. This could have provoked ambiguous data.

The semi-structured interviews have a lower internal validity, since corporate real estate managers of other organizations would interpret the questions differently. Therefore, it would be hard to replicate the results of the interviews.

External validity
The external validity of the content analysis depends on the standard deviation, sample type selection and sample size. The standard deviation will be described in paragraph 4.6. The sample selection type was not random, because only the larger public organizations publicly disclose the sustainability performance of the organization in a CSR report. A randomly selected sample would thus result in almost no data about the CRE sustainability indicators used in the CSR reports. Nevertheless, the sample size of the content analysis is reasonably as it consists of 200 organizations on the fortune 500 global list.

The semi-structured interviews were conducted at organizations that could represent and act as experts in the field of that industry group. A purposive sample was used when selecting the corporate real estate managers for the interviews as the contact details of the CRE executives of all Dutch listed organizations is difficult to compile. Besides that the sample was not randomly chosen, the sample of corporate real estate managers could be biased by other factors. It could be possible that only corporate real estate managers, which have been implementing sustainability in the corporate real estate portfolio, might have been available for an interview about sustainability. Two of the requests for an interview were rejected, as the CRE manager did not believe in sustainability.

4.6   Conclusion

The design of the research methods used in this master thesis has been discussed in this chapter. In order to identify the CRE sustainability indicators used by organizations in their CSR reports, a content analysis has been executed. In addition to a software analysis tool, the indicators have been checked on the relevance of the indicator towards the corporate real estate portfolio. When the relevant CRE sustainability indicators were identified in the 200 CSR reports, the data of the independent variables was collected through several channels, like the annual reports and websites of the organizations.

The data collected during the content analysis has a binary form, as only the presence of the indicator in the CSR reports was recorded. Therefore, the data analysis was performed using logistic regressions in a statistical programme, called Stata 13.1. The internal validity of the content analysis is

The semi-structured interviews were conducted to check and clarify the results of the content analysis. To find the reasons of not implementing and/or reporting of the sustainability performance of the corporate real estate portfolio were the main goals of these interviews.

5. Research results

The results of the logistic regressions based on the data retrieved during the content analysis are discussed in the first part of this chapter. The correlation between the independent variables, identified in the literature review and paragraph 4.3.2, and the reporting of CRE sustainability indicators are evaluated. When the content analysis is discussed, the results of the semi-structured interviews are discussed to find the bottlenecks which corporate real estate managers experience when they implement and report the sustainability performance of the CRE portfolio.

5.1   Data description

The composition of the data collected during the content analysis and the details of the interviewed organizations is described in this paragraph. The organizations with a publicly available CSR report on their website will be addressed, then the characteristics of the organizations are described. The characteristics of the organization are broken down to the geographical difference, industry group distribution, market capitalization, amount of employees and ratio PPE to total assets. The details of the organizations that participated in the interviews are discussed in the last part of this paragraph.

5.1.1   Organization characteristics

The CRE sustainability indicators used in CSR reports can differentiate due to organization specific characteristics, as the occupied buildings facilitate different needs for each industry type. Therefore a corporate real estate portfolio is composed of specific property types, as discussed in the paragraph about the CRE characteristics. The independent variables and their distribution will be discussed in following section.

The regional distribution of the research sample is displayed in figure 23. The organizations are mainly operating for countries in three regions. The organizations in Asia-Pacific, Europe and North America represent almost all organizations in the sample. The "other" regions consist of South America and Africa as these regions were represented by a small amount of organizations.
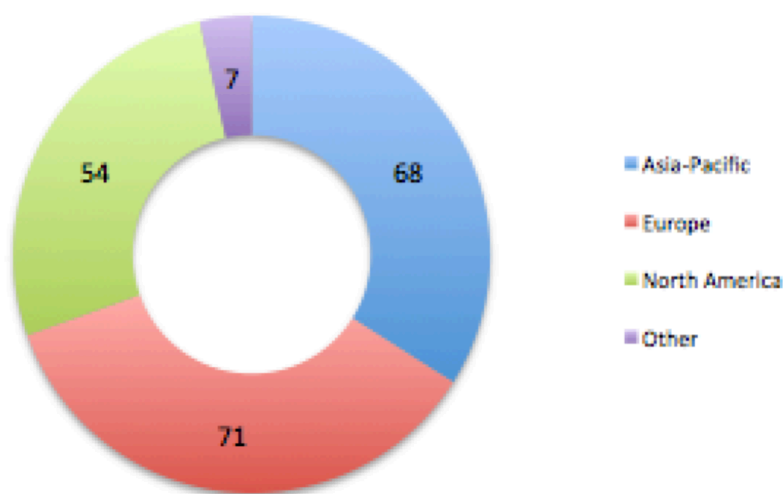
Figure 25: Geographical distribution of the sample

The industry groups are identified using the list provided by the Global Industry Classification Standard (GICS), which is an industry standard used in the financial industry The industry groups represented in this list are: consumer discretionary, financials, industrials, energy, consumer staples, health care, materials, information technology, telecommunication services and utilities. As figure 23 shows, the financial industry group is the largest in the sample and the utility companies are a minority.
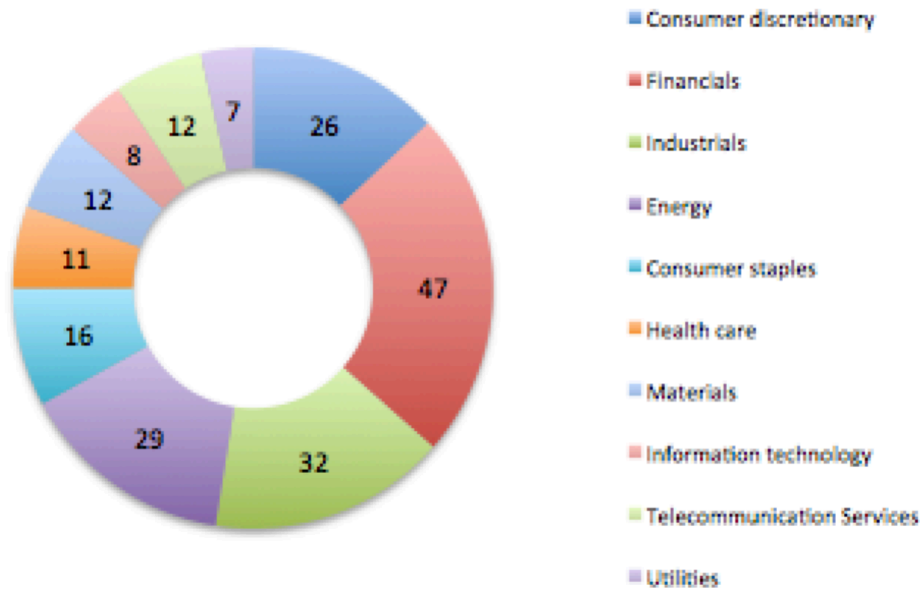
Figure 26: Industry group distribution

The highest market capitalization of the 200 organizations is reported by Apple, which has a market capitalization of around 478 billion US dollars. The Tewoo group in Tianjin has the lowest with a market capitalization of 113 million US dollars. The amount of employees has a range from 2,200,000 employees that work at the Walmart stores, to 1,969 employees that work at LukOil OAO.

The ratio property plant equipment of the total assets of the organizations is displayed in the graph below. Enel S.P.A. has the highest ratio, as the organization operates as an electric utility, which probably owns a lot of his industrial buildings. Seven organizations did not have any property, plant or equipment on their balance sheet.
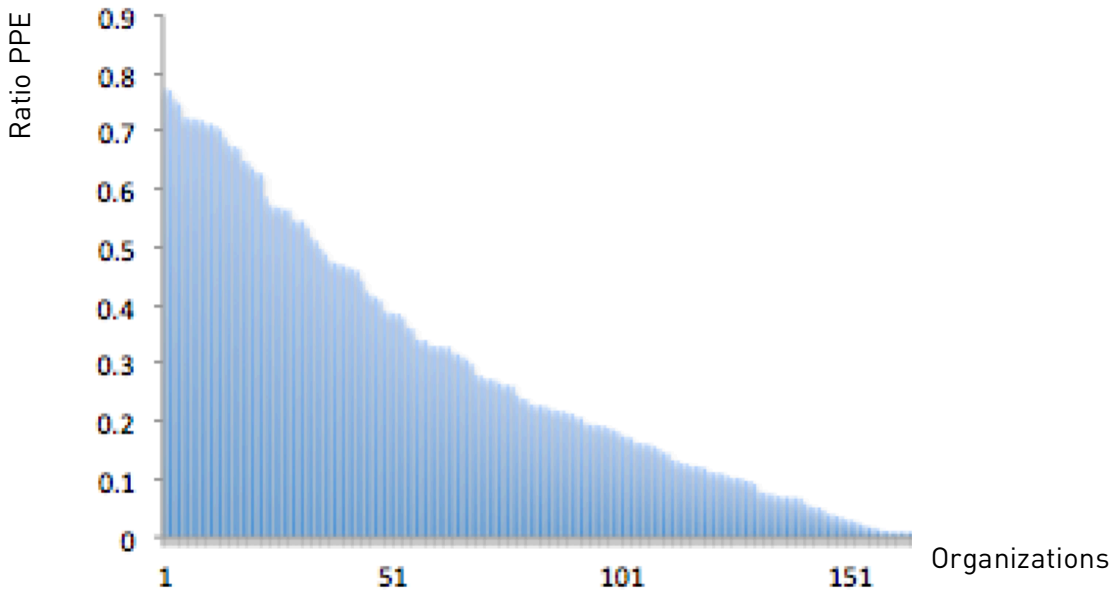
Figure 27: Ratio PPE to total assets

5.1.2   CRE sustainability indicators

Besides the company characteristics of the organization, the availability of the CRE sustainability indicators was checked during the content analysis. Based on the identified indicators, the research showed to what extent organizations report about sustainability of their corporate real estate portfolio to stakeholders. As 143 out of the 200 organizations had a publicly available CSR report published in 2013 or 2014, only those organizations were part of the content analysis and the logistic regressions. The indicators and their frequency is provided in figure 26.

The indicator energy management is analysed by checking the availability of the corporate real estate portfolio's energy consumption, renewable energy and the energy targets. These indicators are specifically focused on the corporate real estate portfolio. The availability of the overall energy consumption of the organization is also part of the analysis and 87 percent of the organizations reported the total energy consumption. Almost half of these organizations report the specific energy consumption of the CRE portfolio. Two third report the energy consumption targets and their goals for the coming years. As the chart reveals, renewable energy generated at buildings is a more common topic to report when it comes to energy management. A relatively small amount of organizations report the greenhouse gas emissions of the corporate real estate portfolio. Reporting of water consumption is less common than reporting energy consumption. The same trend is noticeable when the frequency of organizations that report specific water and waste consumption of their corporate real estate portfolio is examined. 52 percent of the organizations report about the existence of an environmental management system applied to their occupied buildings. Most of them use the ISO 140001 standard as bases, as discussed in the literature review.
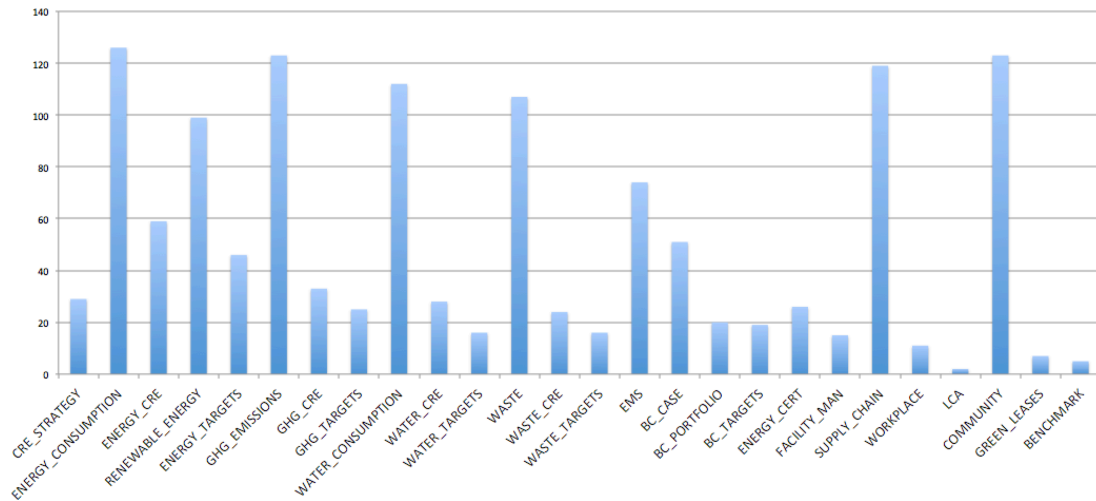
Figure 28: CRE sustainability indicator frequency

The use of building certifications is often only reported as a best practice to show the stakeholders that they are implementing sustainability in their corporate real estate portfolio. Only 20 of the 143 organizations provide the stakeholders with a transparent overview of the building certifications implemented in their buildings. Most of the organizations that report the percentage of buildings certified across the whole portfolio, also report the targets to implement building certifications in the long-term. Sustainability of the supply chain is described by 83% of the organizations, although it was hard to judge during the content analysis if suppliers of the materials for the buildings were also included. Community engagement around the occupied buildings is reported at 123 organizations, which is the equivalent of 86 percent.

An explanation about how the organization manages facilities, sustainability of the workplace, life cycle assessments of the buildings, green leases with the landlords and benchmarking the sustainability performance of the CRE portfolio are not commonly described topics in CSR report. These indicators are probably more used for internal processes and reporting than that it would be interesting for the stakeholders to know.

5.1.3   Semi-structured interviews

The target group for the interviews is corporate real estate managers at Dutch organizations that represent the identified industry groups. In the end, eight organizations were prepared to participate in an interview. However, the number of interviews was sufficient to discover patterns in the drivers and differences between the implementation and reporting of the sustainability performance. Table 1 provides the characteristics of the eight organizations. The interviews were focused on different property types, although most of the interviewees talked about the offices in the CRE portfolio.

Table 1: The organizations, which participated in the semi-structured interviews

Company	INDUSTRY	INDUSTRY GROUP	Employees, 2014	Turnover, 2014	Interview focus	CRE location focus	Interviewees
Insurance compnay	Insurance	Insurance	26981	48254000	Offices	The Netherlands	CRE manager
Energy company	Oil, Gas & Consumable Fuels	Energy	92000	3502808328	Offices	Worldwide	Facility manager
Transport ation	Air Freight & Logistics	Transportat ion	61239	6693000	Offices, logistic	The Netherlands	Ex CRE manager

company					centers		
Retail company	Food & Drug Retailers	Retail	5834	2572000	Retail stores, logistic centers, offices	The Netherlands	CRE manager
Bank company	Bank	Bank	74517	24304000	Offices	The Netherlands	Facility manager
Retail company	Food & Drug Retailers	Retail	123000	32615000	Offices and Retail Stores	The Netherlands	CRE manager
Telecommunication company	Media & Photography	Telecommunication Services	3354	1564843	Data centers	The Netherlands	CRE manager
Capital goods company	Electronic & Electrical equipment	Capital Goods	116681	23329000	Offices and industrial space	The Netherlands	CRE manager

Organization 2 occupies more property types than the interviewer focused on during the interview, because the corporate real estate managers only controlled and managed this part of the portfolio. The same reason can be found when one looks at the focus of the CRE location. Organization 1 organized corporate real estate management per country and was therefore only able to provide information about the Netherlands. Six of the interviewees were corporate real estate managers and two of them were facility managers at the organization. The facility managers were more focused on the facility they were managing, although they provided information about the whole CRE portfolio where possible. At organization 3, an ex corporate real estate manager was interviewed. The interviewee was not working at the organization, but the focus of the interview was still on the organization in question.

The first part of the interview was send one week before the interview was conducted. This part contained specific questions about the characteristics of the corporate real estate portfolio. As the research is conducted to examine the aspects that influence the sustainability implementation and reporting of the sustainability indicators, the percentage owned of the CRE portfolio, value of the owned buildings, property types, total square footage and the main drivers when the CRE portfolio is managed are asked. The results of these questions are provided in table 2.

Table 2: CRE portfolio characteristics of interviewed organizations

Company	INDUSTRY GROUP	Percent owned	Value of owned buildings (in millions)	Property types in portfolio	Total square meters	Main CREM drivers
Insurance compnay	Insurance	60	Private	Offices	10000	Reducing costs, more flexibility
Energy company	Energy	40-45	Private	Offices, logistic centers industrial assets	No data	Improving employee satisfaction, increase flexibility
Transportation company	Transportation	N/A	N/A	Offices, logistic centers	No data	Improving employee satisfaction, increase flexibility
Retail company	Retail	50	215	Offices, logistic centers, retail stores	850000	Reducing costs, increase productivity
Bank company	Bank	30	Private	Offices	No data	Improving employee satisfaction, increase flexibility
Retail company	Retail	25	Private	Office, Logistic centers, Retail stores	No data	Increasing marketing and sales
Telecommunication company	Telecommunication Services	60	Private	Offices, Data centers	No data	Increasing the innovation
Capital goods company	Capital Goods	35	Private	Offices, R&D facilities	No data	Improving productivity, increasing the innovation

The percentages owned buildings based on the floor area are all within the range 30 to 60 percent, which is a normal distribution of owned and leased buildings in the portfolio (Nappi-Choulet and Déchamps, 2011). The property types in the CRE portfolio vary, as the industry groups have different requirements. All of the organizations occupy offices and usually additional property types, like industrial, logistic, retail, data centres and R&D facilities. Only two interviewees were able to provide the total square meters of the CRE portfolio and this data is therefore not used to interpret or understand the choices made by the corporate real estate manager to implement and report about the sustainability performance of the corporate real estate portfolio of the organization.

5.2   Logistic regressions

In order to analyse the collected data of the content analysis, this research paper used logistic regressions, as these are the most applicable with the composed binary data. The data of the 143 organizations was combined in one database, which was used to run the logistic regressions in an organized way. The probability of the presence of each corporate real estate sustainability indicator was checked in a separate logistic regression model (see appendix 3: Logistic regressions).

The output of the logistic regressions indicated that some of the characteristics of the organizations were significantly associated with one or more of the corporate real estate sustainability indicators, which was interpreted by the Wald test. When there is a characteristic that is associated with one of the CRE sustainability indicators, the odds ratio was interpreted. When the odds ratio is significantly higher than 1, the relation was elucidated as a positive association. On the other hand, when the odds ratios are between 0 and 1, the relation was interpreted as a negative influence of the characteristic on the CRE sustainability indicator.

The collected data during the content analysis has been described in the previous paragraph. The relations of the described indicators and the independent variables are analysed by using logistic regressions. The results of these regressions will be discussed in this paragraph. Each CRE sustainability indicator analysed during the content analysis

is part of a logistic regression, since the research wants to perceive which independent variables influence the reporting of that individual CRE sustainability indicator. The statistics of the logistic regressions is presented in table 3.

Table 3: Logistic regression statistics

	Log likelihood	Prob > chi2	Pseudo R2
CRE Strategy	-55.394	0.299	0.120
Energy Consumption	-69.989	0.025	0.150
Renewable Energy	-63.290	0.034	0.150
Energy Targets	-54.540	0.000	0.272
GHG Emissions	-46.376	0.161	0.133
GHG Targets	-32.900	0.108	0.180
Water Consumption	-51.200	0.115	0.150
Water Targets	-33.051	0.414	0.135
Waste	-47.646	0.266	0.124
Waste Targets	-32.193	0.923	0.056
Environmental Management System	-61.176	0.000	0.262
Building Certification Case	-50.804	0.001	0.234
Building Certification Portfolio	-29.668	0.081	0.206
Building Certification Targets	-31.463	0.012	0.264
Energy Certification	-39.080	0.000	0.316
Facility Management	-33.340	0.116	0.223
Supply Chain Management	-49.772	0.082	0.171
Sustainable Workplace	-24.861	0.900	0.054
Life Cycle Assessments	-7.296	0.980	0.049
Community Engagement	-45.564	0.641	0.105
Green Leases	-16.563	0.886	0.066
Benchmark	-12.392	0.730	0.127

The value of the log likelihood does not have any meaning in and of itself, but this value can be used to compare the models with each other. When the log likelihood is closer to 0, the model of the logistic regression is better than a lower value. Particularly, the logistic regressions of the life cycle assessments, green leases and the benchmarking of sustainability performance have low log likelihoods. This is probably due to the low frequency of organizations that reported these indicators in their CSR reports.

The pseudo R^2 is a statistic generated in regressions, which refers and can be used as a goodness-of-fit measure. A higher pseudo R^2 means a greater magnitude of the fit of the model. As table 3 demonstrates, the pseudo R^2 of the models of the logistic regressions is fairly low. The lowest pseudo R^2 is recorded at the 'supply chain' indicator and the highest magnitude of correlation can be seen at the 'building certification targets'.

The results of the logistic regressions are shown in appendix 3. This appendix shows all relevant and irrelevant statistics of the models derived from the analytical software STATA. The interpretation of the logistic regression models is translated to overviews with the positive or negative relation between the independent variable and the reported indicators. The overviews are provided in table 4 for the independent variables of PPE to total assets, employees and the market capitalization.

5.2.1   Results

The results are analysed by interpreting the logistic regression models of the various CRE sustainability indicators. First of all, the P>|Z| were analysed as this would present the significance of the effect between the characteristic and the CRE sustainability indicator. As only 143 observations were taken into account, the significance of the relations should at least 10%. When the output has a significant effect on each other, the nature of the relation depends on the odds ratio. When there is a characteristic that has an effect on one of the CRE sustainability indicators, the odds ratio was interpreted. When the odds ratio is significantly higher than 1, the relation was elucidated as a positive association. On the other hand, when the odds ratios are between 0 and 1, the relation was interpreted as a negative influence of the characteristic on the CRE sustainability indicator. The interpretations of the results based on the logistic regressions are described in the following subparagraphs.

5.2.2   Company characteristics results

The CRE sustainability used in CSR reports may differentiate according to the characteristics of the organization. First the results of the following characteristics will be discussed: ratio property, plant and equipment to total assets, amount of employees and finally the market capitalization. The interpretation of the results is shown in table 4.

Table 4: Results of the ratio PPE to total assets, amount of employees and market capitalization

	PPE to Total assets	Employees	Market cap
CRE Strategy		+	
Energy Consumption			
Renewable Energy			+
Energy Targets			
GHG Emissions			
GHG Targets			-
Water Consumption			
Water Targets			
Waste			
Waste Targets			
Environmental Management System			
Building Certification Case	-	+	
Building Certification Portfolio			
Building Certification Targets			
Energy Certification			
Facility Management		+	
Supply Chain Management			
Sustainable Workplace			
Life Cycle Assessments			
Community Engagement			
Green Leases			
Benchmark			

The ratio of the PPE to total assets appeared to have an effect on the reporting of building certifications of one building case. This means that when the ratio of PPE to total assets is higher, it is unlikely that the organizations report information about this indicator (odds ratio = 0.043). The rest of the indicators were not associated and statistically significant when it comes down to the PPE to total assets on the balance sheet of the organization.

The amount of employees appeared to have an effect on reporting the corporate real estate strategy, a case of a building with a green building certificate and the facility management at the buildings. When an organization has a higher amount of employees, they are more likely to publish and report their CRE strategy. It is possible that organizations with many employees need more corporate real estate to accommodate their operational tasks and the need for a CRE strategy could be higher when the corporate real estate management manages a multitude of buildings. In addition to the positive association of the amount of employees on the reporting of a building certification case, the reporting of the facility management in the CSR report is more presumable when the organizations have a high amount of employees. When there are more employees occupying the buildings, good management of the facilities is crucial.

Finally, the market capitalization of the organizations was analysed by conducting logistic regressions. The height of the market capitalization appeared to have an effect on the reporting about the renewable energy sources implemented at the buildings. As the costs of renewable energy sources are still relatively high, this indicator is apparently more often reported in the CSR report of the organization. The target set by the organization to

reduce the greenhouse gas emissions has a negative association with the market capitalization.

5.2.3　Regional results

The influence of the regional origin of the organization on the reported indicators is discussed in this subparagraph. Dummy variables are used to classify the regions in an appropriate way for the logistic regressions. Table 5 shows for each region the positive and negative associations between the indicators and the regions. As discussed in the previous chapter, only North America, Europe, Asia-pacific and the other regions are part of the logistic regressions.

Especially the organizations from North America have strong associations with some of the reported indicators. These organizations are more likely to have energy targets in place to reduce the energy consumption of the organization. Besides that, the organizations report the total greenhouse gas emissions of the CRE portfolio more often than the organizations in the other regions. The water consumption and the targets set to reduce this consumption have a positive association with the region as well. All CRE sustainability indicators associated with the building certifications of the buildings have a strong affiliation with the North American organizations. Only when North American organizations report about their environmental management systems, they are lacking behind.

Table 5: Regional results

	North America	Europe	Asia-pacific	Other
CRE Strategy				
Energy Consumption				
Renewable Energy				
Energy Targets	+	+		
GHG Emissions	+			
GHG Targets				
Water Consumption	+			
Water Targets	+			
Waste				
Waste Targets				
Environmental Management System	-	+		
Building Certification Case	+			
Building Certification Portfolio	+			
Building Certification Targets	+			
Energy Certification	+			
Facility Management		+		
Supply Chain Management				
Sustainable Workplace				
Life Cycle Assessments				
Community Engagement				
Green Leases				
Benchmark				

The CSR reports of the European organizations have a positive association with the energy targets, the environmental management system and the facility management of the CRE portfolio. Especially energy targets and facility management with respectively odds ratios of 7.8 and 11.8, are strongly associated with this region. The Asia-pacific and other regions are not at all significantly associated with the identified CRE sustainability indicators.

5.2.4   Industry group results

The last company specific characteristics to discuss are the industry group in which the organizations operate. The organizations have been categorized in one of the ten sectors, identified by GISC. All of these industry sectors have at least 7 organizations and the sectors are utilities, telecommunication services, materials, information technology, industrials, healthcare, financials, energy, consumer staples and consumer discretionary. The positive and negative associations of these industry sectors on the reported CRE sustainability indicators are shown in table 6.

Table 6: Industry group results

	Utilities	Tele-communication	Materials	Information	Industrials	Healthcare	Financials	Energy	Consumer staples	Consumer discretionary
CRE Strategy										
Energy Consumption				+			+			
Renewable Energy			-							
Energy Targets		+		+	+		+			
GHG Emissions					+					
GHG Targets		+			+					
Water Consumption				+			+			
Water Targets				+						
Waste										
Waste Targets										
Environmental Management System					+					
Building Certification Case										
Building Certification Portfolio					+		+			
Building Certification Targets										
Energy Certification										
Facility Management	+									
Supply Chain Management							-			
Sustainable Workplace										
Life Cycle Assessments										
Community Engagement										
Green Leases										
Benchmark										

Some of the relations stand out while analysing the results of the logistic regressions. The relations between the specific industry sector and the reported indicators will be discussed. How the facilities are managed by the organizations is positively related to the CSR reports published by organizations that operate in the utilities sector. The energy targets are positively associated with organizations that operate in the telecommunications, information, industrials and financials sectors. In particular, the organizations that operate in the information, industrials and financial sectors are positively associated with a couple of the CRE sustainability indicators.

5.3 Semi-structured interviews

The second part of the semi-structured interview is segregated in multiple topics. The first topic is related to the alignment between the CSR strategy and the corporate real estate strategy. The aim of the interviews is to get more insight in how the organizations structured their corporate real estate portfolio. When discussing the CRE strategy, focus was on reviewing and analysing to what extent the implementation of relevant sustainability measures is part of the CRE strategy and understanding if and how sustainability measures are used by the organization to improve the sustainability performance of their corporate real estate and their entire business. The incentives to implement these measures specifically are part of the discussion as well.

As the characteristics of an organization can influence the management of corporate real estate, the barriers when implementing sustainability in leased and owned buildings were examined. The last topics addressed during the interviews were related to the way organizations measure and report corporate real estate sustainability performance and, the responsibility within the organization to report the sustainability performance of the corporate real estate portfolio is discussed.

Alignment of corporate real estate strategy with sustainability strategy
The companies interviewed did not all have a corporate real estate strategy in place to manage their CRE portfolio. Even more of them did not have a strategy to implement and report sustainability in their CRE portfolio. Although the organizations realize the importance of sustainability for the overall performance, there are several reasons why the companies did not formulate and execute a CRE sustainability strategy. The insurance company claims: *"As the CREM department is coordinated per country, the organization does not have a corporate real estate sustainability strategy. In the Netherlands, we occupy two buildings in total and sustainability is coordinated on case-by-case research."* Retail company 1 points out: *"The management of our corporate real estate portfolio is devoted to accommodate the core business of the organization. The CSR policy does not include specific policies or targets for the corporate real estate portfolio."* The retail company 2 and the bank company had a similar explanation: *"We do not have a sustainability strategy for the CRE portfolio; we examine the feasibility and advantages of sustainability individually per building."*

The transportation, capital goods and telecommunication companies have a corporate real estate strategy with sustainability aspects included. The transportation company claims: *"The strategy of the organization is leading when you manage the corporate real estate portfolio, but the organization did not have a CRE sustainability strategy until the CEO was convinced about the benefits of implementing it."* The incentives to implement a strategy at this company were based on the influence of the corporate executives. At the capital goods company, sustainability is not the main focus point of the strategy, but they state that: *"The corporate real estate strategy is primarily focused on encouraging and supporting employee innovation and creativity, but without forgetting to support the environmental sustainability of the organization."* Finally the telecommunication company

said: *"The CREM sustainability strategy of this organization is interweaved with the CSR strategy of the organization. As the organization mainly occupies data centers and offers online services to the customer, sustainability gains are only possible in the improvement of the corporate real estate portfolio."*

At five out of the eight interviewed organizations, sustainability measures were implemented without a strategy behind it. The feasibility of implementing the sustainability measures is reviewed on an ad-hoc basis without an actual planning and vision for the implementation of sustainability in general.

Implementation of sustainability measures
The implementation of sustainability measures at the interviewed organizations is reflected in a matrix with the indicators identified during the literature review. The matrix is displayed in appendix 5. The interviewed corporate real estate managers did not talk about CRE sustainability indicators, since these were not identified yet. Therefore the list of CRE sustainability indicators was not amended based on the interviews.

At almost all interviewed organizations, the sustainability measures are only implemented in the corporate real estate portfolio when it has financial benefits for the organization. The transportation company stated: *"The organization implements sustainability features in the CRE portfolio, only when the sustainable measures are financially attractive for the organization. It has less to do with preserving or saving the environment."* The retail company 1 said: *"Although an incentive for the organization to implement sustainability also comes from the obligation of a large organization to preserve and protect the environment, we cannot implement sustainability at all costs as it is an organization with commercial purposes. … When the organization has a new real estate project, we will always look at implementing sustainability measures, but only when it has financial benefits. For example, solar panels are not implemented as the return on investment is too lengthy."*

Retail company 2 would implement sustainability measures to improve the image of their retail stores, even when the financial benefits are not directly noticeable. Improving the image of the organization is one of their main drivers when managing the corporate real estate portfolio. They point out the following: *"The implementation of sustainability is mainly focused on the core business of the retail organizations. Our customers need to perceive sustainability in the supermarkets."* The bank company has a similar approach when they decide to implement sustainability: *"As a bank, the predominant part of the CRE portfolio consists of offices. Therefore, our CRE department concentrates on improving the productivity of the employees, promoting our organizational brand and increasing the satisfaction among the employees. The CRE strategy is based on these two drivers".* Retail company 1 also tries to support the core business by improving the sustainability performance of the CRE portfolio, as they state*: "As the core business concentrates on reducing the loss of food, the corporate real estate portfolio is focused to reduce these losses. When it is possible to accomplish this in a sustainable way, the organization would definitely implement sustainability measures at their logistic and retail buildings."*

The ad-hoc implementation of sustainability measures can be recognized at retail company 1. That company stated: *"At one of our buildings, we used the green building certification standard BREEAM to certify the building. As it was financial feasible, due to the subsidy of the government, it was interesting to opt for a BREEAM label. But we only did this for this building as it was financially attractive".* The corporate real estate manager at the transportation company gives a possible explanation for this selective implementation of sustainability measures: *"Only the headquarters of an organization is often sustainable in this industry sector, in order to improve the image towards*

shareholders, potential investors and their employees. Nowadays, the customers are requesting to see the logistic centers as well. Sustainability at these sites is therefore becoming more important for the transportation companies." This would explain the reason of organizations to implement the measures on an ad-hoc basis. Only when stakeholders want transparency, buildings in the CRE portfolio are improved.

Owned versus leased corporate real estate

When organizations want to implement sustainability in their corporate real estate portfolio, there is an enormous difference between interviewed organizations that own their buildings and the ones that lease their buildings. When an organization owns the building, they do not need to negotiate with their landlord to what extent it is financially feasible to implement sustainability measures and who pays and/or benefits from the implementation. The interviewed organizations all had similar answers regarding the barriers to implement sustainability in the owned buildings. As the capital goods company stated: *"When you improve buildings in your CRE portfolio owned by the organization, the benefits are directly for the organization itself."* The difference between owned and leased corporate real estate becomes clear when the capital goods company continues: *"But when it comes down to leased buildings, it is a completely different story. When you want to implement sustainability measures in the CRE portfolio, it is burden to negotiate and communicate with the landlord. When one owns the building, you only need approval from senior management"*

When the occupied building is leased, the earlier discussed 'circle of blame' often causes the implementation of sustainability measures to stall. Existing buildings are often leased for a longer period, and during this period it is hard to negotiate implementation of additional sustainability measures. According to the telecommunication company: *"It is hard to implement sustainability measures as a tenant, although we try to engage with the suppliers, managers and owners of the buildings to improve the energy efficiency. We try to agree on the implementation of sustainable measures in new lease contracts, but we cannot amend existing lease contracts. We need to wait for the lease to expire, which can last for 10 years".* The insurance company tries to be an active tenant as well, as they state: *"Our organization is an active tenant, as we negotiate new sustainable refurbishments when we are about to sign a new lease contract. If they are not able to provide these sustainable measures, CREM will look into other office locations."* Retail company 1 has a similar approach to break the 'circle of blame': *"The organization is an active tenant, because we try to engage with the landlords to implement financial feasible sustainability measures."* The transportation company tries to find a balance between the landlord and the lease requests: *"The organization is a very "active" tenant, because the organization is big enough to be arrogant against the landlords. If they are not willing to grant our requirements, we can search for another building. However, we try to find the best solution for both the landlord and tenant when it comes down to the implementation of sustainability."*

Corporate real estate disclosure in CSR reports

In order to report the actual impact of the implemented measures, the organizations need to measure the sustainability performance of their buildings/portfolio. The measurement of this performance is analyzed by using systems at the organization. The insurance company points out: *"The organization uses ISO 140001 to manage the quality of the systems that measure environmental performance of the corporate real estate portfolio. An internal system is used to record the consumption of the buildings".* Besides the measurement of energy consumption, GHG emissions, water consumption and waste disposal, retail company 1 states: *"The supply chain is monitored as well, as we ask for quarterly updates about their sustainability performance."*

None of the interviewed corporate real estate managers were responsible for the content communicated about the CRE portfolio in the CSR report. As the insurance company explains: *"When the sustainability performance is measured, the data is send to the designated marketing department to include relevant information in the CSR report."* The capital goods company has a different reason: *"The organization only publishes an integrated annual report, which combines the financial and CSR performance of the core business in one integrated report."* Retail company 2 blames the lack of data on the fact that the data of their leased buildings is not communicated by the landlord: *"We do not report the sustainability performance of the corporate real estate portfolio as we would like to, because we lease 75% of the buildings. It is hard to collect the data of these buildings."*

The corporate real estate managers are not responsible and do not have any influence on the reported CRE sustainability indicators in the CSR reports of their organizations, which could explain why the energy company states: *"When CRE sustainability indicators are not reported in our externally communicated reports, it does not mean the organization is not implementing these indicators. Some of the indicators are not relevant for the stakeholders and we use these indicators solely for internal purposes."* The telecommunication company has an extensive part included in their CSR report about energy efficiency, GHG emissions and E-waste of their buildings. The telecommunication company clarifies: *"The organization reports mainly about the energy efficiency of the buildings, as this is a factor in which we can achieve the highest reduction. We report all CRE sustainability indicators in our CSR report, since this is the only way to show our engagement with the environment."* Unless the corporate real estate portfolio can play an important part in reducing the environmental impact of the organization, the responsible department for the CSR report does not include all CRE sustainability indicators in the CSR report.

The implementation of sustainability in the corporate real estate portfolio is executed at almost all interviewed organizations in a less strategic form than the other known strategic mechanism of corporate real estate management. However, all interviewed organizations did not have the feeling that they were implementing the corporate real estate sustainability indicators in an inferior way than their competitors. The urgency to implement sustainability in their corporate real estate portfolio as a strategic resource.

5.4 Conclusion

The goal of this chapter was to describe the data collected in the content analysis and the semi-structured interviews and present the results of the logistic regressions and the second part of the interviews. The description of the data collected during the content analysis gave more information about the company characteristics of the 200 organizations. In addition, 143 out of the 200 organizations published a CSR report, which were analysed on the availability of the identified CRE sustainability indicators. The frequency of these indicators demonstrated that some of the indicators were not regularly disclosed in the CSR reports of these organizations.

The descriptive results proved that the amount of employees at an organization has a positive influence on the reporting of the CRE strategy, building certifications and mentioning the facility management. In addition to the amount of employees, the North American organizations are more likely to include their energy targets, GHG emissions, water consumption, water targets and the building certification performances. The European organizations are more focused on including the energy targets, EMS and facility management in their corporate social responsibility reports. When one looks at the industry sector specific results, the information, industrial and financial organizations have positive associations with four or five CRE sustainability indicators. These were

mainly the energy consumption, energy, GHG and water targets and the percentage of buildings with certifications in the CRE portfolio.

According to the interviewed corporate real estate managers, it is not a standard at organizations to have a corporate real estate sustainability strategy. Sustainability is primarily implemented at the buildings in the corporate real estate portfolio on an ad-hoc basis. This means that the corporate real estate managers decide to implement sustainability measures on a case-by-case exploration of the advantages and disadvantages of the CRE sustainability measure. The decision is often made based on the financial feasibility of the sustainability measure. When the organization does not financially gain something, the measure is not implemented in the portfolio.

When corporate real estate managers want to measure the sustainability performance of their CRE portfolio, the biggest challenge is to retrieve the environmental data of the leased properties. The data of buildings that are owned by the organization is collected without difficulty. When the measured sustainability performance is composed and aggregated to the portfolio level, the data is sent to the department that is responsible of creating the CSR report. The corporate real estate managers are not engaged and do not contribute to the content of the CSR report. This process explains the fact that the CSR reports only disclose certain CRE sustainability indicators. Although some of the organizations are already implementing more sustainability measures in their portfolio than they report in the publicly available documents, many of the organizations do not know what the standard of the sustainability performance in their industry sector is.

6 Conclusions and recommendations

The last chapter explains which conclusions and recommendations can be derived from the literature review and the results of the content analysis and semi-structured interviews conducted at the organizations. As bases for the conclusions, the research questions are used to recapitulate on the topics. The conclusions are followed by a reflection on the conducted research. The final part of the thesis provides the recommendations for the interviewed organizations and GRESB B.V. and will conclude with suggestions for further research.

6.1 Conclusions

The conclusions of this thesis are the answer to the main research question, which was formulated in chapter 1:

To what extent and why do organizations implement an report sustainability of their corporate real estate portfolio and what are the possible bottlenecks to implement and report sustainability?

The question was divided in six sub questions and the most profound findings in the previous chapters will be discussed in this section.

6.1.1 Corporate real estate sustainability management

Corporate real estate sustainability management does have a specific definition in the existing literature. Corporate real estate management has been a topic of many researchers and sustainability as a topic within the real estate literature is emerging as well. The definitions of these two topics were merged by UNEP (2014) in the following definition:

"Corporate Real Estate Sustainability Management (CRESM) refers to the integrated management of all economic, environmental and social aspects of an organisation's property (real estate) activities and associated investment decision-making. It comprises and applies to all relevant strategies, processes and organisational structures that support corporate governance and sustainable business and product development."

This definition teaches us that corporate real estate sustainability management is focused on adding value to the organization by contributing to the overall sustainability performance in the organization. The drivers for organizations to implement sustainability in the CRE portfolio can be separated into external, corporate and building levels. Stakeholders and governmental bodies define and influence the external drivers. The corporate level reflects the advantages for the organization, by improving the image and reputation, engage with employees and increase the productivity and wellbeing of the customers and employees. The implementation of sustainability in the portfolio can reduce the operational costs and therefore increase the value of the buildings. Although the drivers of sustainability in the CRE portfolio are evident in the existing literature, organizations are not implementing sustainability measures, as the circle of blame is still a problem in the real estate market.

6.1.2   Corporate real estate sustainability indicators

The CRE sustainability indicators have not been examined in existing literature to a large extent. Only the research of Masalskyte et al. (2014) examined the sustainability measures used by corporate real estate managers to improve the sustainability performance of the buildings. The identified indicators at the interviewed Finish organizations, as part of this research, were the basis of the literature review on the CRE sustainability indicators. These indicators were examined and overlapping indicators were taken out as these were not adding new information. Some of the indicators, like energy and water management, can be divided in multiple CRE sustainability indicators, which are used in the CSR reports of the organizations. In addition to these measures, green leases were included in the list of indicators. The compiled list used during the content analysis is displayed in figure 28.

Figure 29: Corporate real estate sustainability indicators

The added value of the measures is different among all measures and is implemented during different stages of a generic sustainability maturity model for corporate real estate management. When organizations implement sustainability in their CRE portfolio, they can be associated with one of the five stages in the maturity model. The first stage can be achieved by recognizing sustainability and have minimal compliance. Most of the organizations, which were part of the semi-structured interviews, were still exploring sustainability in the first stage of the maturity model. The interviews clearly showed that the organizations implemented and reported sustainability in an ad hoc style.

The second stage obliges the organization to plan and initiate sustainability in the buildings. When the completion of the plans needs to be measured, the organization is at the 'measure and manage' step of the sustainability maturity model. The interviewed energy company was a good example of an organization in the second stage of the maturity model. Most of the indicators are implemented and subsequently measured by the corporate real estate management, although the organization still execute these decisions without a corporate real estate sustainability strategy in place.

When the organization measures their sustainability performance, sustainability should be integrated into specific aspects of corporate real estate management, only then will the sustainability performance improve. Only the capital goods and the telecommunication services companies are currently in this phase, as their corporate real estate management has a clear corporate real estate strategy in mind to measure, implement and report about the sustainability performance of the corporate real estate portfolio.

Finally, the organization should constantly optimize the performance and innovate with new sustainability indicators. When the five stages are completed, the sustainability performance of the CRE portfolio is at the highest level. Although, the market will always evolve due to technological developments and an organization needs to keep innovating to stay in the final stage of sustainability maturity.

6.1.3   Corporate real estate sustainability reporting

The frequency of the CRE sustainability indicators used in the 143 CSR reports is provided in figure 29. Apart from the more frequently used indicators as energy consumption, GHG emissions, water consumption and waste, often indicators as renewable energy, supply chain management and community engagement are topics frequent addressed by the organizations.
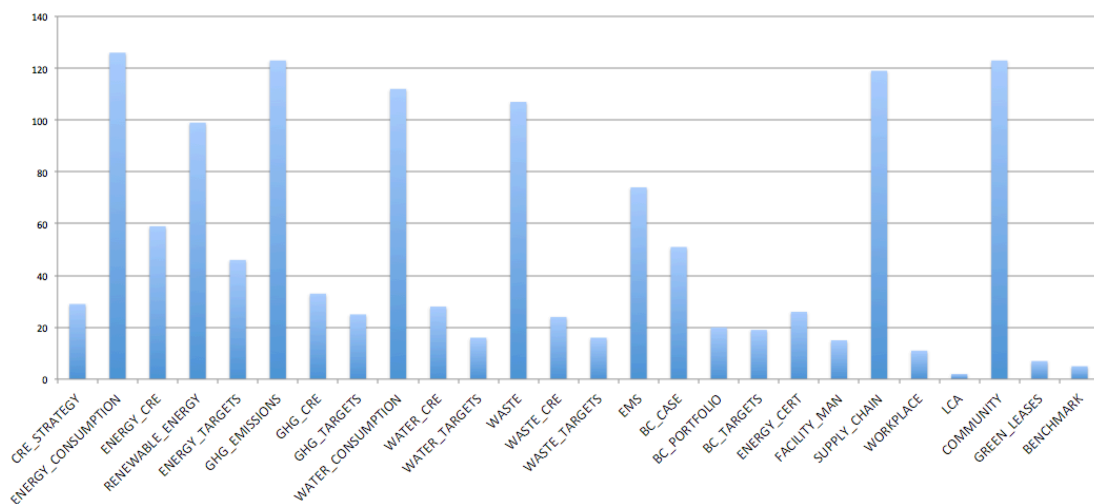
Figure 30: CRE sustainability indicator frequency

As the literature review revealed, the characteristics of the organization could influence the CRE sustainability indicators reported in their CSR reports. This is caused by the fact that the characteristics influence the corporate real estate occupied by the organization. The amount of employees has the highest positive associations with the CRE sustainability indicators reported in the CSR reports. When an organization has a higher amount of employees than average, it is more likely that the CSR report describes the corporate real estate strategy, a building with a green building certificate and how the facilities are managed. The market capitalization is positively associated with the reporting about the renewable energy sources at the buildings. As organizations with a high market capitalization have more resources available, they are apparently focusing more on the relatively expensive renewable energy sources at their buildings.

The regional differences are found when one looks at the North American organizations with positive associations with eight of the twenty-one CRE sustainability indicators. Ranked from most likely reported to least likely, these indicators are: building certification targets, energy ratings, building certifications reported on portfolio level,

building certification reported on building level, water targets, GHG emissions, water consumption and energy targets for the CRE portfolio. As the regulations to certify are becoming more apparent in North America and in some states even mandatory (EPA, 2013), this trend can be an explanation for the disclosure of building certification indicators in the CSR reports. The European organizations are positively associated with the reporting of the energy targets, environmental management system and facility management. External drivers in the European Union could explain the energy targets set by the organizations included in this research study. Since 2015, it is mandatory to apply for an Energy Performance Certificate (EPC) when commercial real estate is acquired.

The industry sector, in which the organization operates, has influence on the CRE sustainability indicators reported by the organization. Organizations, which operate in the information, industrials and financial sector, are positively associated with multiple CRE sustainability indicators. Organizations in the industrial sector, for example, are positively associated with communicating energy targets, GHG emissions, GHG targets, EMS and the building certifications at portfolio level. Organizations in the financial sector are positively associated with the energy consumption and targets, water consumption and building certification portfolio indicators. But a negative association can be found with the reporting on supply chain management. Apparently, the supply chain is less relevant for financial organizations, as there core business is less depended on other organizations.

Compared to a comparable study of Laprosa and Villapuram (2010), which analyzed the frequency of mentioning relevant corporate real estate terms in CSR reports, this research demonstrates that organizations only report about the specific indicators used in the implementation of their corporate real estate portfolio. The CSR reports of the organizations, only communicate the indicators in which they are superior. This trend was noticeable during the content analysis and when the corporate real estate managers answered the questions during the semi structured interviews. A good example of this phenomenon is the reporting about the amount of building certifications in the corporate real estate portfolio. Most of the CSR reports only communicate about the headquarters of the organization, as this building has the highest rating in their used building certification scheme. Only a handful, communicates the overall status of the building certifications in the corporate real estate portfolio.

The topic of the low frequency of reported CRE sustainability indicators in CSR reports was part of the semi-structured interviews. Apparently, most of the corporate real estate managers do not decide which CRE sustainability indicators should be included in the CSR report of their organization. The reporting and implementation of sustainability measures is often misaligned, as it does not mean that not reported CRE sustainability indicators, are not implemented within the organization's corporate real estate. The interviewed corporate real estate managers are often implementing sustainability on an ad-hoc basis; this ad-hoc approach could explain the lack of reporting in the CSR reports.

Based on the maturity model of Masalskyte et al. (2014), most of the interviewed organizations are still in the early stages of implementing and measuring sustainability in a structured way. Only when organizations fully acknowledge sustainability as the eight strategy to maximize value for the shareholders, it would be possible to mature the process of implementing and reporting of sustainability in the corporate real estate management profession. Until then, the real benefits of the implementation of sustainability in corporate real estate management will be less effective.

6.2 Reflection

This thesis is based on three research methods to collect data. The literature review, content analysis and the semi-structured interviews contributed to the overall research conducted. A couple of remarks should be made in order to interpret the conclusions correctly. These remarks will be discussed in this paragraph.

The available literature about the corporate real estate sustainability management at organizations is rather scarce. Only a couple of papers are specifically about how organizations should manage sustainability performance of their corporate real estate portfolio, focusing on multiple sustainability indicators. Only the paper of Laposa and Villupuram (2010) about the presence of corporate real estate in CSR reports and the paper of Masalskyte et al (2014) about the sustainability maturity model in CREM were specific enough in this field. Most of the other dissertations analyse only one CRE sustainability indicator in detail.

The content analysis was a very time consuming exercise, even with the help of the data analysis software. Analysing the number of CSR reports on relevant CRE sustainability indicators was more time consuming than anticipated before hand. In retrospect, I could have chosen a smaller and more specific random sample, which could have had a higher external validity. Although the organizations in the current sample altogether have a higher environmental impact as these organizations are the largest in the world.

The semi-structured interviews were conducted at eight organizations. Although it would have been better to interview organizations from all industry sectors, it was not feasible to retrieve the contact details of these corporate real estate managers and actually schedule the interviews. The eight interviews still answered my questions in a meaningful way. Hindsight, the interview questions could have been more specific to really test the corporate real estate managers.

6.3 Recommendations for CRE managers

For organizations, which are trying to manage their corporate real estate in the most efficient way, the implementation of sustainability indicators is possibly still a bridge to far. Before considering to report and implement sustainability in the corporate real estate portfolio, the organizations should first further mature their CREM.

The implementation of sustainability indicators within CREM should be further structured to move away form the current ad-hoc approach, by actively managing the corporate real estate sustainability performance. Only when the organizations realize this, the last stage of the maturity model of Masalskyte et al (2014) can be achieved.

6.4 Recommendations for benchmark standards

The recommendations for benchmark standards can be argued in two ways. The first one relates to the ad-hoc stage in which the management of the corporate real estate departments are implementing and report on the sustainability performance of the portfolio. When an organization is not mature enough, benchmarking the organization's corporate real estate sustainability management performance against similar organizations does not make sense as the measures are only implemented based on a case-by-case decision. A specific framework or benchmark for corporate real estate organizations could therefore be to soon.

However, one could argue that the organizations are missing reference points and should learn from organizations in their peer group. When, in the near future, stakeholders are becoming more aware of the environmental impact of organizations, they could request more transparency about the sustainability performance of the corporate real estate portfolio. You could interpret the results of this paper like there should be more guidance and support for CRE managers, as organizations do not know what the standard or limits are of implementing and reporting sustainability in the corporate real estate portfolio.

When benchmark standards want to guide the corporate real estate managers on the roadmap to sustainable corporate real estate and the integration of sustainable corporate real estate management in their corporate sustainability strategy, benchmark standard should not start with an overwhelming framework or benchmark. A benchmark standard can lay the foundations for a structured approach to measure corporate real estate sustainability performance. However, it is important to understand the wide variety in the approach taken, caused by the maturity of CREM approaches as well as an understanding of the relevance of a sustainable approach for their real estate and in some cases even a sustainable business approach. Transparency in this field will enable corporate occupiers to have an understanding of the relevance of certain topics and what their peers do in comparison. This can be the basis for building their approach to further integrate sustainability within their corporate real estate sustainability strategy. For a benchmark standard, it is important to set the right pace and to motivate corporate occupiers to participate. Since, in comparison with the existing benchmark, investors are likely to have less influence on corporate real estate decisions, since they do not directly invest in the organization's real estate.

6.5   Further research

As discussed at the reflection, corporate real estate sustainability has not been a regularly used topic in the existing literature. Further research could therefore be conducted in more specific corporate real estate sustainability measures. Topics like green leases could be interesting as the financial benefits of such a lease have never been part of a research paper.

Besides more specific topics, the research conducted in this paper could be done more extensively. During the content analysis, the software only scanned through the readable text in the CSR reports. The illustrations and figures in the CSR reports are therefore not analysed when checking the availability of the CRE sustainability indicators. As the content analysis only checked the availability of the indicator, further research could define the possible quality of an indicator. When the quality is determined, the influence of the company characteristics on the quality of the indicators can be analysed in more detail.

The semi-structured interviews only focused on explaining the differences between the industry groups, they were not comparing the regional scope of the organizations. This was primarily due to the fact that the interviews were conducted at Dutch listed organizations and not across all regions. This could lead to different insights and conclusions. Besides that, the interviewed corporate real estate managers were often not able to answer specific questions about the sustainability of the organization.

Finally, the two research methods could be integrated more in the future. Both methods were conducted distinct of each other and it would have been nice to check the results of the content analysis even more. This was often impossible, as the corporate real estate managers were not involved when the CSR reports of the organizations were compiled. For further research, it could be really interesting to interview the responsible

sustainability manager of the organization and at the same time the corporate real estate manager. When sustainability is integrated into the core of the company, both managers should be aligned with their sustainability approach, but the interviews showed me that this is often not the case.

Appendix 1: GRI Standards and Real Estate

GRI Section	Description	CRE Implications Not Specifically Addressed in GRI Standards
Organization profile, section 2.9 (Reporting Guidelines)	The location of, or changes in operations, including facility openings, closings, and expansions.	Direct property linkages, yet no requirement on corporation's summary square footage or square meter data, properties and certification status or strategies for new construction properties, matrix of properties by lifecycle stage, table of owned properties, size of properties, type of properties, age of properties especially list of at-risk properties due to functional obsolesce, environment contaminants, or subject to national or local changes in building or certification codes.
EN11	Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas.	Does not include land owned or leased not adjacent to protected areas; not required if corporation's real estate assets listed under section 2.9.
EC1	Economic Value Generated and Distributed (EVG&D); monetary value to local economies.	Identify revenues from sale or donation of property and other assets that benefit local economies.
EC2	Financial implications and other risks and opportunities for the organization's activities due to climate change.	List significant scheduled or planned capital improvements to maintain, rectify, or certify corporate owned properties.
EN3, EN4, and EN5	Direct energy consumption by primary energy source. Indirect energy consumption by primary source. Energy saved due to conservation and efficiency improvements.	Standardize direct and indirect energy consumption according to corporate real estate inventory of properties; discuss energy savings due to efficiency improvements for corporate owned properties.
EN13	Habitats protected or restored.	Discuss the role of corporate real estate properties or facilities in protecting or restoring habitats.
EN16, EN17, and EN18	Total direct and indirect greenhouse gas emissions by weight. Other relevant indirect greenhouse gas emissions by weight. Initiatives to reduce greenhouse gas emissions and reductions achieved.	Standardize direct and indirect greenhouse gas emissions according to corporate real estate inventory of properties, e.g., GHG per square foot or square meter; discuss initiatives to reduce greenhouse gas emissions relative to efficiency improvements for corporate owned properties.
SO1	Nature, scope, and effectiveness of any programs and practices that …manage the impacts of operations on communities, including entering, operating, and exiting.	Identify corporate owned properties scheduled for disposition, abandonment, or closing; identify significant corporate leased properties scheduled for closure or nonrenewal that may negatively impact local communities.

Appendix 2: Textual queries used in content analysis

EMS	BC_CASE	ENERGY_CERT	FACILITY_MAN	WORKPLACE	LCA	COMMUNITY	LEASES
Environmental management system	Building certification	Energy certification	facility management	workplace	life cycle assessment	communit*	Green leases
EMS	LEED	Energy star	facilit*		lca	community engagement	Lease*
ISO14001	CASBEE	Energy certificate			lcc		
Management system	BREEAM	Energy label					
DMS	GreenMark	EPC					
	BEAM plus	Energy performance certificate					
	BERDE	Minergie					
	BOMA	Nabers					
	DGNB	Voldec					
	GPR	EPA					
	Green building	Portfolio manager					
	GreenStar						
	HQE						
	Miljšbyggnad						
	GREEN GLOBES						
	Greenleaders						
	Greenship						
	Green seal						
	Green key						

Appendix 3: Logistic regression

Corporate real estate strategy

```
Logistic regression                          Number of obs   =        121
                                             LR chi2(13)     =      15.14
                                             Prob > chi2     =     0.2988
Log likelihood = -55.392766                  Pseudo R2       =     0.1202
```

cre_strategy	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.534125	.8288672	-0.40	0.686	.0255111	11.18295
employees_ratio	40.40004	80.6733	1.85	0.064	.8065843	2023.549
market_cap_ratio	3.332951	5.411008	0.74	0.458	.1383289	80.30544
region_na	1.945879	1.561638	0.83	0.407	.4036418	9.380707
region_ot	1	(omitted)				
region_eu	2.868812	1.946596	1.55	0.120	.7588048	10.84611
region_as	1	(omitted)				
sector_utilities	3.191974	4.846706	0.76	0.445	.1627765	62.59317
sector_telecommunication	2.912471	3.646352	0.85	0.393	.2503662	33.88033
sector_materials	2.538205	3.753247	0.63	0.529	.1399117	46.0468
sector_information	8.518625	11.48278	1.59	0.112	.6067123	119.6069
sector_industrials	3.261899	3.597489	1.07	0.284	.3755743	28.32991
sector_healthcare	2.283912	3.532249	0.53	0.593	.1102122	47.3292
sector_financials	4.644399	5.265312	1.35	0.176	.5034195	42.84784
sector_energy	1.350621	1.681002	0.24	0.809	.117792	15.48642
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0301006	.0393273	-2.68	0.007	.0023252	.3896689

Energy management

```
Logistic regression                          Number of obs   =        121
                                             LR chi2(13)     =      24.77
                                             Prob > chi2     =     0.0248
Log likelihood = -69.988704                  Pseudo R2       =     0.1503
```

energy_cre	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	2.954875	3.720848	0.86	0.390	.2504299	34.86519
employees_ratio	2.010863	3.865608	0.36	0.716	.0464584	87.03638
market_cap_ratio	2.002197	2.934049	0.47	0.636	.1132775	35.38913
region_na	2.693208	1.748331	1.53	0.127	.7545729	9.612547
region_ot	1	(omitted)				
region_eu	2.288285	1.220796	1.55	0.121	.8042585	6.510655
region_as	1	(omitted)				
sector_utilities	.6455261	.8703212	-0.32	0.745	.0459509	9.068467
sector_telecommunication	3.341133	3.145216	1.28	0.200	.5279646	21.14378
sector_materials	.5359586	.6962604	-0.48	0.631	.0420089	6.837883
sector_information	14.14885	18.98116	1.98	0.048	1.020481	196.172
sector_industrials	2.73516	2.212923	1.24	0.214	.5601512	13.3555
sector_healthcare	4.479175	5.291338	1.27	0.204	.4422389	45.36691
sector_financials	7.326961	6.133664	2.38	0.017	1.420209	37.80032
sector_energy	.9244616	.8482181	-0.09	0.932	.1530696	5.583273
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0909412	.0840725	-2.59	0.010	.0148542	.5567642

```
Logistic regression                              Number of obs   =        114
                                                 LR chi2(12)     =      22.35
                                                 Prob > chi2     =     0.0337
Log likelihood = -63.289799                      Pseudo R2       =     0.1501
```

renewable_energy	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	2.824098	3.596822	0.82	0.415	.232688	34.27562
employees_ratio	.6980817	1.50055	-0.17	0.867	.0103329	47.16196
market_cap_ratio	118.581	241.8196	2.34	0.019	2.178602	6454.344
region_na	.5833049	.4174344	-0.75	0.451	.1434645	2.371629
region_ot	.1552675	.1893708	-1.53	0.127	.0142206	1.695281
region_eu	1.185076	.6671385	0.30	0.763	.3931539	3.572153
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	5.14758	6.580548	1.28	0.200	.4201908	63.06083
sector_materials	.1605117	.1746501	-1.68	0.093	.0190252	1.354206
sector_information	1	(omitted)				
sector_industrials	1.65636	1.327568	0.63	0.529	.3442857	7.968752
sector_healthcare	.2302874	.2971801	-1.14	0.255	.0183576	2.888846
sector_financials	1.277418	1.039024	0.30	0.763	.2594081	6.290457
sector_energy	.8790729	.7336871	-0.15	0.877	.1712378	4.512842
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.76211	.6575324	-0.31	0.753	.1404814	4.134437

```
Logistic regression                              Number of obs   =        115
                                                 LR chi2(12)     =      40.74
                                                 Prob > chi2     =     0.0001
Log likelihood = -54.539862                      Pseudo R2       =     0.2719
```

energy_targets	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	4.534523	7.128249	0.96	0.336	.2081836	98.76808
employees_ratio	5.343586	12.74682	0.70	0.482	.0498127	573.226
market_cap_ratio	7.783151	13.01212	1.23	0.220	.2938254	206.1681
region_na	4.782614	3.690435	2.03	0.043	1.054018	21.70115
region_ot	1	(omitted)				
region_eu	7.819241	5.360735	3.00	0.003	2.039839	29.97322
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	6.232736	6.534983	1.75	0.081	.7983614	48.65842
sector_materials	.9649566	1.372175	-0.03	0.980	.059442	15.6647
sector_information	10.51518	13.20611	1.87	0.061	.8969847	123.2674
sector_industrials	4.707471	4.358563	1.67	0.094	.766788	28.90014
sector_healthcare	3.622362	4.678823	1.00	0.319	.2880962	45.54557
sector_financials	12.86706	12.41157	2.65	0.008	1.942719	85.22139
sector_energy	.1871863	.2710526	-1.16	0.247	.0109573	3.197751
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0142024	.0169239	-3.57	0.000	.0013742	.1467814

GHG emissions

```
Logistic regression                          Number of obs    =         86
                                             LR chi2(10)      =      14.27
                                             Prob > chi2      =     0.1609
Log likelihood = -46.375648                  Pseudo R2        =     0.1334
```

ghg_cre	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	7.008643	12.42118	1.10	0.272	.2173096	226.0419
employees_ratio	.9041667	2.613277	-0.03	0.972	.0031337	260.8809
market_cap_ratio	.0796984	.1627746	-1.24	0.216	.0014554	4.364449
region_na	8.319209	7.58577	2.32	0.020	1.392914	49.68667
region_ot	1	(omitted)				
region_eu	7.86321	6.372048	2.54	0.011	1.606269	38.49297
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	2.735847	2.918295	0.94	0.345	.3381625	22.13392
sector_materials	1	(omitted)				
sector_information	5.582544	7.220873	1.33	0.184	.4424104	70.44317
sector_industrials	6.257608	5.726266	2.00	0.045	1.041079	37.61259
sector_healthcare	1.858404	2.644281	0.44	0.663	.1142838	30.22008
sector_financials	3.215404	3.126046	1.20	0.230	.4782879	21.61631
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0302974	.0366981	-2.89	0.004	.0028208	.3254124

```
Logistic regression                          Number of obs    =         65
                                             LR chi2(9)       =      14.44
                                             Prob > chi2      =     0.1075
Log likelihood = -32.900318                  Pseudo R2        =     0.1800
```

ghg_targets	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.3475173	.9011512	-0.41	0.684	.0021563	56.00635
employees_ratio	4.406651	21.8856	0.30	0.765	.000261	74403.82
market_cap_ratio	.0013178	.0040764	-2.14	0.032	3.07e-06	.5661115
region_na	2.491784	2.078092	1.09	0.274	.48599	12.77595
region_ot	1	(omitted)				
region_eu	1	(omitted)				
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	11.84139	17.66302	1.66	0.098	.6363868	220.3352
sector_materials	1	(omitted)				
sector_information	7.783483	13.48933	1.18	0.236	.2606043	232.4697
sector_industrials	22.97937	30.14109	2.39	0.017	1.757326	300.4858
sector_healthcare	4.884002	8.707566	0.89	0.374	.1483166	160.8281
sector_financials	10.5901	15.32901	1.63	0.103	.620582	180.7179
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.1259478	.1839904	-1.42	0.156	.0071898	2.206304

Water management

```
Logistic regression                          Number of obs   =        115
                                             LR chi2(12)     =      18.03
                                             Prob > chi2     =     0.1149
Log likelihood = -51.19888                   Pseudo R2       =     0.1497
```

water_cre	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	3.991507	6.342552	0.87	0.384	.1772423	89.88897
employees_ratio	.0064603	.03151	-1.03	0.301	4.56e-07	91.61772
market_cap_ratio	.1551524	.2762103	-1.05	0.295	.0047359	5.082894
region_na	7.304006	5.902525	2.46	0.014	1.498604	35.59881
region_ot	1	(omitted)				
region_eu	1.993736	1.423873	0.97	0.334	.4917698	8.083012
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	4.368891	5.006424	1.29	0.198	.4623359	41.2843
sector_materials	1.12945	1.611431	0.09	0.932	.0689325	18.50589
sector_information	10.50367	14.10554	1.75	0.080	.7555264	146.0268
sector_industrials	3.702861	3.792785	1.28	0.201	.4973524	27.56833
sector_healthcare	1.485287	2.168616	0.27	0.786	.0849181	25.97887
sector_financials	5.798991	6.081193	1.68	0.094	.742554	45.28735
sector_energy	.2805347	.40886	-0.87	0.383	.016122	4.881508
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0548059	.063614	-2.50	0.012	.0056341	.5331253

```
Logistic regression                          Number of obs   =         86
                                             LR chi2(10)     =      10.31
                                             Prob > chi2     =     0.4135
Log likelihood = -33.050678                  Pseudo R2       =     0.1350
```

water_targets	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	2.042587	4.944025	0.30	0.768	.0177775	234.6878
employees_ratio	.0822098	.4538741	-0.45	0.651	1.64e-06	4114.747
market_cap_ratio	.3470556	.7158797	-0.51	0.608	.0060898	19.77847
region_na	10.3258	12.73109	1.89	0.058	.9213911	115.7188
region_ot	1	(omitted)				
region_eu	4.019291	4.759756	1.17	0.240	.3945779	40.94172
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	5.08516	7.096859	1.17	0.244	.3298876	78.38685
sector_materials	1	(omitted)				
sector_information	17.73788	27.21338	1.87	0.061	.8769848	358.7661
sector_industrials	2.535565	3.391089	0.70	0.487	.1843612	34.87224
sector_healthcare	2.944081	4.841425	0.66	0.511	.1172688	73.91238
sector_financials	4.690815	6.453656	1.12	0.261	.3163437	69.55645
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.014029	.0246344	-2.43	0.015	.0004491	.4382295

Waste management

```
Logistic regression                          Number of obs   =         86
                                             LR chi2(10)     =      10.31
                                             Prob > chi2     =     0.4135
Log likelihood = -33.050678                  Pseudo R2       =     0.1350
```

water_targets	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	2.042587	4.944025	0.30	0.768	.0177775	234.6878
employees_ratio	.0822098	.4538741	-0.45	0.651	1.64e-06	4114.747
market_cap_ratio	.3470556	.7158797	-0.51	0.608	.0060898	19.77847
region_na	10.3258	12.73109	1.89	0.058	.9213911	115.7188
region_ot	1	(omitted)				
region_eu	4.019291	4.759756	1.17	0.240	.3945779	40.94172
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	5.08516	7.096859	1.17	0.244	.3298876	78.38685
sector_materials	1	(omitted)				
sector_information	17.73788	27.21338	1.87	0.061	.8769848	358.7661
sector_industrials	2.535565	3.391089	0.70	0.487	.1843612	34.87224
sector_healthcare	2.944081	4.841425	0.66	0.511	.1172688	73.91238
sector_financials	4.690815	6.453656	1.12	0.261	.3163437	69.55645
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.014029	.0246344	-2.43	0.015	.0004491	.4382295

```
Logistic regression                          Number of obs   =        107
                                             LR chi2(11)     =      13.44
                                             Prob > chi2     =     0.2656
Log likelihood = -47.645016                  Pseudo R2       =     0.1236
```

waste_cre	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	2.729415	4.930164	0.56	0.578	.0791658	94.10256
employees_ratio	.0364977	.1701938	-0.71	0.478	3.92e-06	340.0461
market_cap_ratio	.1004856	.1959216	-1.18	0.239	.0022003	4.589152
region_na	2.427926	1.991632	1.08	0.280	.4863997	12.1193
region_ot	1	(omitted)				
region_eu	1.748914	1.265	0.77	0.440	.4237301	7.218513
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	3.070517	3.083289	1.12	0.264	.4290118	21.97625
sector_materials	1	(omitted)				
sector_information	3.528948	4.414863	1.01	0.313	.303918	40.97644
sector_industrials	.4540842	.4705889	-0.76	0.446	.0595657	3.461599
sector_healthcare	1.118313	1.579421	0.08	0.937	.0702087	17.81296
sector_financials	1.954305	1.853519	0.71	0.480	.3045708	12.53997
sector_energy	.1443929	.1986407	-1.41	0.160	.0097398	2.140622
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.2109035	.2430796	-1.35	0.177	.0220303	2.019051

Environmental management system

```
Logistic regression                          Number of obs   =        120
                                             LR chi2(13)     =      43.47
                                             Prob > chi2     =     0.0000
Log likelihood = -61.176245                  Pseudo R2       =     0.2621
```

ems	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	10.29921	14.349	1.67	0.094	.6712723	158.019
employees_ratio	.0016692	.0078991	-1.35	0.177	1.56e-07	17.80755
market_cap_ratio	2.223567	3.824475	0.46	0.642	.0763848	64.72824
region_na	.0977987	.0845544	-2.69	0.007	.0179641	.5324285
region_ot	1.521391	1.744785	0.37	0.714	.1607137	14.4022
region_eu	2.569721	1.460561	1.66	0.097	.8435012	7.828637
region_as	1	(omitted)				
sector_utilities	1.404001	1.751379	0.27	0.786	.121776	16.18725
sector_telecommunication	1.126655	1.175429	0.11	0.909	.1457941	8.706463
sector_materials	2.947917	3.44641	0.92	0.355	.2981091	29.15111
sector_information	1	(omitted)				
sector_industrials	13.50889	13.44431	2.62	0.009	1.920823	95.00626
sector_healthcare	11.38895	17.35456	1.60	0.110	.5746674	225.7098
sector_financials	1.166189	1.090523	0.16	0.869	.1865504	7.290242
sector_energy	1.700672	1.724208	0.52	0.600	.2331518	12.40516
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.2953085	.3037342	-1.19	0.236	.0393358	2.21699

Building certifications

```
Logistic regression                          Number of obs   =        101
                                             LR chi2(10)     =      31.10
                                             Prob > chi2     =     0.0006
Log likelihood = -50.804247                  Pseudo R2       =     0.2344
```

bc_case	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.042645	.0781893	-1.72	0.085	.0011727	1.550744
employees_ratio	107.1522	279.2845	1.79	0.073	.6477474	17725.42
market_cap_ratio	.5214138	.977409	-0.35	0.728	.0132304	20.54899
region_na	9.972929	8.174039	2.81	0.005	2.000592	49.71493
region_ot	1	(omitted)				
region_eu	2.268795	1.543082	1.20	0.228	.5982258	8.604495
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	3.861963	3.84796	1.36	0.175	.5478894	27.22221
sector_materials	1	(omitted)				
sector_information	1	(omitted)				
sector_industrials	.8651438	.7426411	-0.17	0.866	.1608478	4.653303
sector_healthcare	1.242571	1.551007	0.17	0.862	.1076045	14.34868
sector_financials	1.982298	1.780307	0.76	0.446	.3409592	11.52485
sector_energy	.5554843	.6223439	-0.52	0.600	.0618041	4.992593
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.2100735	.2204056	-1.49	0.137	.0268723	1.642244

```
Logistic regression                          Number of obs    =         65
                                             LR chi2(9)       =      15.37
                                             Prob > chi2      =     0.0813
Log likelihood = -29.667921                  Pseudo R2        =     0.2057
```

bc_portfolio	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.162889	.55595	-0.53	0.595	.0002026	130.9468
employees_ratio	.0000156	.0001264	-1.36	0.173	1.92e-12	126.1397
market_cap_ratio	.1008713	.2471025	-0.94	0.349	.0008291	12.27268
region_na	12.72728	12.72489	2.54	0.011	1.79347	90.3186
region_ot	1	(omitted)				
region_eu	1	(omitted)				
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	12.55158	19.95245	1.59	0.112	.5566701	283.0083
sector_materials	1	(omitted)				
sector_information	3.433161	6.013871	0.70	0.481	.1108266	106.3517
sector_industrials	16.97678	26.59363	1.81	0.071	.7879023	365.7953
sector_healthcare	1.518867	2.616279	0.24	0.808	.0519168	44.43565
sector_financials	17.08356	27.89043	1.74	0.082	.6964918	419.0258
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0586985	.0927134	-1.80	0.073	.0026556	1.297439

```
Logistic regression                          Number of obs    =         86
                                             LR chi2(10)      =      22.59
                                             Prob > chi2      =     0.0124
Log likelihood = -31.462802                  Pseudo R2        =     0.2641
```

bc_targets	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.0089789	.0339122	-1.25	0.212	5.47e-06	14.72636
employees_ratio	.011035	.076025	-0.65	0.513	1.51e-08	8074.11
market_cap_ratio	.082314	.1838351	-1.12	0.264	.0010338	6.553845
region_na	43.21874	58.76619	2.77	0.006	3.00788	620.9886
region_ot	1	(omitted)				
region_eu	2.075172	2.552455	0.59	0.553	.1862426	23.1222
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	1.984282	3.04381	0.45	0.655	.0981508	40.11557
sector_materials	1	(omitted)				
sector_information	2.471933	3.566043	0.63	0.530	.1462454	41.78218
sector_industrials	1.809898	2.407623	0.45	0.656	.1334569	24.54525
sector_healthcare	.4086892	.6547467	-0.56	0.576	.0176894	9.442207
sector_financials	4.591647	6.719101	1.04	0.298	.2608426	80.82738
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0612015	.1059815	-1.61	0.107	.0020547	1.822939

Energy certifications

```
Logistic regression                          Number of obs    =        113
                                             LR chi2(12)      =      36.03
                                             Prob > chi2      =     0.0003
Log likelihood = -39.080417                  Pseudo R2        =     0.3155
```

energy_cert	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.5759719	1.441055	-0.22	0.825	.004273	77.63676
employees_ratio	.0927887	.3851266	-0.57	0.567	.0000272	316.5722
market_cap_ratio	.6648756	1.218761	-0.22	0.824	.0182992	24.15731
region_na	40.62391	50.41103	2.99	0.003	3.568686	462.4395
region_ot	1	(omitted)				
region_eu	3.206649	3.727191	1.00	0.316	.3286037	31.29179
region_as	1	(omitted)				
sector_utilities	5.276343	8.472994	1.04	0.300	.2266911	122.8094
sector_telecommunication	4.159581	5.042614	1.18	0.240	.386498	44.76637
sector_materials	1	(omitted)				
sector_information	6.291827	8.878733	1.30	0.192	.3959141	99.9891
sector_industrials	.3794307	.4971376	-0.74	0.460	.0290986	4.947589
sector_healthcare	1.285842	1.712868	0.19	0.850	.0944721	17.50136
sector_financials	4.09293	4.814559	1.20	0.231	.4080906	41.0499
sector_energy	.4157332	.6797496	-0.54	0.591	.0168674	10.24666
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.023595	.0381259	-2.32	0.020	.0009941	.5600548

Facility management

```
Logistic regression                          Number of obs    =        113
                                             LR chi2(12)      =      17.99
                                             Prob > chi2      =     0.1161
Log likelihood = -31.339804                  Pseudo R2        =     0.2230
```

facility_man	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.3193495	.7373056	-0.49	0.621	.0034597	29.47797
employees_ratio	248.0767	605.8957	2.26	0.024	2.0684	29753.45
market_cap_ratio	4.077433	8.031485	0.71	0.476	.0858501	193.6568
region_na	5.62496	8.644055	1.12	0.261	.2767265	114.3373
region_ot	1	(omitted)				
region_eu	11.77819	16.78061	1.73	0.083	.7216972	192.2214
region_as	1	(omitted)				
sector_utilities	55.43631	115.9421	1.92	0.055	.9194982	3342.24
sector_telecommunication	17.28108	34.22454	1.44	0.150	.3562854	838.1928
sector_materials	1	(omitted)				
sector_information	23.93517	52.07975	1.46	0.144	.3364612	1702.7
sector_industrials	3.593247	7.241365	0.63	0.526	.0691968	186.59
sector_healthcare	12.02717	27.63946	1.08	0.279	.1330548	1087.167
sector_financials	2.945882	6.30798	0.50	0.614	.0443147	195.8315
sector_energy	8.642865	16.59891	1.12	0.261	.2003998	372.7505
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0015979	.004305	-2.39	0.017	8.14e-06	.3138657

CRE supply chain

```
Logistic regression                          Number of obs    =        120
                                             LR chi2(13)      =      20.55
                                             Prob > chi2      =     0.0823
Log likelihood = -49.771965                  Pseudo R2        =     0.1711
```

supply_chain	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.2159126	.3115195	-1.06	0.288	.0127691	3.650857
employees_ratio	.0686206	.1387865	-1.32	0.185	.0013028	3.614307
market_cap_ratio	.533818	1.096552	-0.31	0.760	.0095254	29.91611
region_na	3.960728	3.816372	1.43	0.153	.5992347	26.179
region_ot	.156026	.1876178	-1.54	0.122	.014779	1.647206
region_eu	1.647257	1.013367	0.81	0.417	.4933047	5.500568
region_as	1	(omitted)				
sector_utilities	.7488165	1.1432	-0.19	0.850	.0375722	14.92398
sector_telecommunication	1.884178	2.828956	0.42	0.673	.0993356	35.73873
sector_materials	.2029347	.2524887	-1.28	0.200	.0177134	2.324931
sector_information	1	(omitted)				
sector_industrials	2.221201	3.129047	0.57	0.571	.140438	35.13105
sector_healthcare	.1600041	.2604267	-1.13	0.260	.0065871	3.886582
sector_financials	.1441722	.1658852	-1.68	0.092	.0151177	1.374921
sector_energy	.9359912	1.074738	-0.06	0.954	.0986035	8.884877
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	12.70051	16.07012	2.01	0.045	1.063615	151.6553

Sustainable workplaces

```
Logistic regression                          Number of obs    =         56
                                             LR chi2(7)       =       2.83
                                             Prob > chi2      =     0.9001
Log likelihood = -24.860514                  Pseudo R2        =     0.0539
```

workplace	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	1.287507	3.020237	0.11	0.914	.0129718	127.7909
employees_ratio	.0001636	.001466	-0.97	0.331	3.87e-12	6916.191
market_cap_ratio	5.074978	19.18971	0.43	0.668	.0030679	8395.2
region_na	.5614638	.743146	-0.44	0.663	.0419452	7.51555
region_ot	1	(omitted)				
region_eu	.702048	.6371248	-0.39	0.697	.1185446	4.157688
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	1	(omitted)				
sector_materials	1	(omitted)				
sector_information	1	(omitted)				
sector_industrials	.4452217	.4528271	-0.80	0.426	.0606505	3.268273
sector_healthcare	.7065713	1.04578	-0.23	0.814	.0388429	12.85287
sector_financials	1	(omitted)				
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.5205815	.4722228	-0.72	0.472	.0879748	3.080485

Life cycle assessments of buildings

```
Logistic regression                        Number of obs  =        35
                                           LR chi2(5)     =      0.75
                                           Prob > chi2    =    0.9803
Log likelihood = -7.2925641                Pseudo R2      =    0.0487
```

lca	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.1911434	1.248363	-0.25	0.800	5.27e-07	69275.75
employees_ratio	1.65994	27.25714	0.03	0.975	1.75e-14	1.58e+14
market_cap_ratio	1.728571	11.85973	0.08	0.936	2.50e-06	1196145
region_na	1.929909	3.592904	0.35	0.724	.0502178	74.16783
region_ot	1	(omitted)				
region_eu	1	(omitted)				
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	1	(omitted)				
sector_materials	1	(omitted)				
sector_information	1	(omitted)				
sector_industrials	3.109713	6.453048	0.55	0.585	.0532561	181.5813
sector_healthcare	1	(omitted)				
sector_financials	1	(omitted)				
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.0322335	.050925	-2.17	0.030	.0014572	.7130183

Community engagement around buildings

```
Logistic regression                        Number of obs  =       121
                                           LR chi2(13)    =     10.65
                                           Prob > chi2    =    0.6405
Log likelihood = -45.564094                Pseudo R2      =    0.1046
```

community	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.6182087	1.046098	-0.28	0.776	.0224275	17.0408
employees_ratio	2.725001	8.761594	0.31	0.755	.0049949	1486.632
market_cap_ratio	.2027404	.3790443	-0.85	0.393	.0051943	7.913165
region_na	1.93256	1.787664	0.71	0.476	.3153201	11.84444
region_ot	.6434603	.8946516	-0.32	0.751	.0421727	9.817746
region_eu	1.155116	.7820588	0.21	0.831	.306428	4.354341
region_as	1	(omitted)				
sector_utilities	.3972959	.5182355	-0.71	0.479	.0308178	5.121853
sector_telecommunication	2.181581	2.952726	0.58	0.564	.1537047	30.96389
sector_materials	.7833578	.964762	-0.20	0.843	.070088	8.755415
sector_information	.3983365	.5398031	-0.68	0.497	.0279737	5.672186
sector_industrials	3.089007	4.081523	0.85	0.393	.2318043	41.16389
sector_healthcare	1	(omitted)				
sector_financials	.5669118	.5840168	-0.55	0.582	.0752716	4.269722
sector_energy	5.34168	7.413541	1.21	0.227	.3518223	81.10215
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	6.226155	7.446574	1.53	0.126	.5972695	64.90372

Green leases when buildings are leased

```
Logistic regression                        Number of obs   =        36
                                           LR chi2(6)      =      2.34
                                           Prob > chi2     =    0.8857
Log likelihood = -16.562692               Pseudo R2       =    0.0660
```

green_leases	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	.08775	.6512871	-0.33	0.743	4.22e-08	182359.4
employees_ratio	.0265993	.281729	-0.34	0.732	2.57e-11	2.76e+07
market_cap_ratio	.0093145	.0383102	-1.14	0.256	2.94e-06	29.51964
region_na	1.466672	2.09762	0.27	0.789	.0889104	24.19431
region_ot	1	(omitted)				
region_eu	1	(omitted)				
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	1.715675	4.03348	0.23	0.818	.0171118	172.0181
sector_materials	1	(omitted)				
sector_information	3.583019	7.492707	0.61	0.542	.0594621	215.9025
sector_industrials	1	(omitted)				
sector_healthcare	1	(omitted)				
sector_financials	1	(omitted)				
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.62348	.5109442	-0.58	0.564	.1251007	3.107316

CRE sustainability performance benchmarked with peers

```
Logistic regression                        Number of obs   =        34
                                           LR chi2(6)      =      3.61
                                           Prob > chi2     =    0.7290
Log likelihood = -12.391522               Pseudo R2       =    0.1272
```

benchmark	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
ppe_ta	108.0357	835.4757	0.61	0.545	.0000282	4.13e+08
employees_ratio	.005161	.058685	-0.46	0.643	1.08e-12	2.46e+07
market_cap_ratio	1.350535	3.612987	0.11	0.911	.0071343	255.6598
region_na	.7317013	1.240106	-0.18	0.854	.0264056	20.27551
region_ot	1	(omitted)				
region_eu	1	(omitted)				
region_as	1	(omitted)				
sector_utilities	1	(omitted)				
sector_telecommunication	1	(omitted)				
sector_materials	1	(omitted)				
sector_information	5.558206	13.6075	0.70	0.484	.0458183	674.2648
sector_industrials	1	(omitted)				
sector_healthcare	2.176387	4.133703	0.41	0.682	.0526033	90.04491
sector_financials	1	(omitted)				
sector_energy	1	(omitted)				
sector_consumerstaples	1	(omitted)				
sector_consumerdiscretionary	1	(omitted)				
_cons	.1154635	.1282027	-1.94	0.052	.0131018	1.01756

Appendix 4: Semi-structured interview script

Semi structured interview – Corporate real estate sustainability indicators

Name: _____

Company: _____

Duration: 45 minutes_____

Introduction

Thank you for being willing to take part in an interview in this research. Can I first of all assure you that you, if you wish so, will remain completely anonymous and no records of the interview will be kept with your name on them. Also I would like to ask you for permission to audio record this interview. The main reason behind this recording is to have a set of accurate data.

As part of my internship at GRESB BV in Amsterdam, I am writing my master thesis about the reporting of the sustainability performance of corporate real estate occupiers at the University of Technology in Eindhoven, the Netherlands. The goal of the research is to understand the behaviour of corporate real estate executives to measure and report about the sustainability performance of their corporate real estate.

Therefore, I am conducting interviews with Corporate Real Estate experts and sustainability managers to get a better view on the current way organizations measure and report their real estate sustainability and how they would like to assess and improve it in the future.

Interview script (first part)

Portfolio characteristics

Can you describe the corporate real estate portfolio of your company?
_____
_____
_____

What is the percentage leased and owned real estate?
_____
_____
_____

What is the current value of the "owned" part?
_____
_____
_____

What property types does the organization have in the CRE portfolio?
- o Office space
- o Industrial space
- o Warehousing space
- o Retail space
- o _____
- What is the total square footage of the real estate portfolio?
  - o _____ sq ft/sq m

What is/are the main driver(s) of the organization when managing the occupied real estate?
- Reducing costs   _____
- Increasing asset value   _____
- Increasing flexibility   _____
- Promoting marketing and sales   _____
- Increasing innovation   _____
- Increasing productivity   _____
- Increasing employee satisfaction   _____
- Supporting sustainability   _____
- _____   _____

What does sustainability mean within your organization?
_____
_____
_____

What is the definition of sustainability used at the organization?
_____
_____
_____

Interview script (second part)

Alignment of corporate real estate strategy with sustainability strategy
Can you tell me how the support of the corporate sustainability is incorporated in the decision making of the corporate real estate management?
_____
_____
_____

What are the incentives to support the sustainability performance of the organization when managing the real estate portfolio?
_____
_____
_____

How do you incorporate sustainability aspects in the "portfolio planning" or "strategic CRE planning"?
_____
_____
_____

In your opinion, how important is sustainability when managing your real estate?
_____
_____
_____

Management style of CRE management
How does the type of ownership (leased vs owned) influence the way you manage the real estate portfolio?

_____
_____
_____

Do you address sustainability differently in leased and owned assets when you implement sustainability in the real estate?
_____
_____
_____

Are you an "active" tenant, i.e. requesting sustainable buildings, sustainable fit-outs, datasharing, etc?
_____
_____
_____

Can you tell me about the communication with the facility managers in relation to implementing sustainability in the corporate real estate?
_____
_____
_____

Measuring corporate real estate sustainability

How does the organization measure the sustainability performance of the real estate portfolio?
_____
_____
_____

Could you describe which indicators corporate real estate managers use to measure the sustainability performance?
_____
_____
_____

Can you tell how targets are used to improve the performance of these sustainability indicators?
_____
_____
_____

-   How do you make sure these targets are implemented at the property level?
    _____
    _____
    _____

What are the barriers/bottlenecks when measuring the sustainability performance of corporate real estate?
_____
_____
_____

Are the measured sustainability indicators reflected in the communication to stakeholders?

_____
_____
_____

Corporate real estate disclosure in sustainability reporting
A brief summary of the current disclosure of real estate in the CSR report of the organization is provided to the participant. The CRE sustainability indicators identified in the CSR report will be discussed in this part of the interview.

Can you tell me about how important it is to disclose the real estate performance in CSR reports?

_____
_____
_____

What are the bottlenecks to report transparent sustainability data of the corporate real estate portfolio?

_____
_____
_____

      o   How do you choose the disclosed indicators in the CSR report?

_____
_____
_____

      o   What is the motive to exclude real estate indicators in sustainability reports?

_____
_____
_____

What is the reason of misalignment between what the indicators used to implement sustainability and the indicators used to report transparent sustainability data of the corporate real estate portfolio?

_____
_____
_____

Conclusion

Give a summary of the topics discussed during the interview.

_____
_____
_____

Do you have anything to add regarding the sustainability of corporate real estate?

_____
_____
_____

Appendix 5: Semi-structured interview results

Company	CRE strategy	Energy managt	Renew energy	Energy targets	GHG emis.	GHG targets	Water managt	Water targets	Waste managt	Waste targets	EMS	Building cert.	Energy cert	Facility managt	Supply chain managt	Sust. workp	LCA	Com. Eng.	Green leases	Benchmark
Insurance	0	1	0	1	1	1	1	1	0	0	1	0	1	1	1	1	0	0	1	1
Energy	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	0	0	0	0
Transportation	0	1	1	1	1	0	1	1	0	0	1	1	1	1	0	1	0	0	0	0
Retail 1	0	1	0	1	1	1	1	1	1	0	0	1	1	1	1	1	0	1	0	1
Bank	0	1	0	0	1	0	1	1	0	0	0	0	1	1	0	1	0	0	1	0
Retail 2	1	1	0	1	1	1	1	1	0	0	0	1	1	1	1	1	0	1	0	0
Telecommunication Services	1	1	1	1	1	0	0	0	0	0	1	0	1	1	1	1	0	0	1	0
Capital Goods	1	1	1	1	1	0	1	1	0	0	1	0	1	1	1	1	0	0	0	0

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