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***Value of Commercial Real Estate investments:  
Sustainability perspective in Sweden and France.***

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## Master of Science thesis

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### Abstract

During the recent decades the notion of sustainability has been introduced to almost all businesses and business areas. Sustainability in real estate and particularity in construction has been discussed by many researchers and journalists. Nowadays, not only many countries have adopted the sustainable construction techniques and started using green building materials but also it has started to be important to have sustainable property management, sustainable real estate valuation techniques as well as on the investment side, there has been a major trend to sustainable real estate investments.

Many real estate companies are interested in investments into “green” properties both in France and in Sweden. The main objective of this thesis was to investigate the main force that drives these investments, whether they are driven by personal consciousness of investors, by the overall market trend or by the premium that they may receive from the sustainable investment. The purpose was to better understand the reasons behind the green real estate investments as well as to investigate the difference in value of certified sustainable real estate and its impact on the investment decisions.

For the following thesis the qualitative research was used the most since its purpose is to get a better understanding of the motivation of companies to invest into sustainable real estate. However, quantitative data was as well applied in from of investigation about amount of investment transactions in different real estate sectors, repartition of types of investors, number of sustainable buildings with different certifications, etc.

The research showed that real estate investors both in Sweden and France are most interested in the purchase of green buildings due to their ability to produce higher income and durability of buildings itself. The main premium that they are expecting from such investments is in better marketability of the building and thus shorter vacancy periods. Both qualitative and quantitative data have confirmed this conclusion.

## **Acknowledgement**

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Paris,

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Daria Bryunina

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## List of Abbreviations

**RICS-** *Royal Institution of Chartered Surveyors,*

**INSEE-** *L'Institut National de la Statistique et des Etudes Economiques ( French National Institute for Statistics and Economic Studies),*

**HQE-** *Haute Qualité Environnementale (high environmental quality certificate),*

**DGNB-** *Deutsche Gesellschaft für Nachhaltiges Bauen (German Society for Sustainable Buildings),*

**BREEAM-** *Building Research Establishment Environmental Assessment Methodology,*

**LEED-** *Leadership in Energy and Environmental Design.*

# 1. Introduction

## 1.1. Background

Real estate has been a popular investment during many years, although, as a result of a financial crisis of 2008, the amount of real estate investment transactions fell drastically the following years. However, there is a recovering trend in the transaction volume after the financial crisis of 2008 (CBRE research, 2013). Both in Sweden and in France the transaction volume in the end of 2013 was twice higher than in the last quarter of 2009, which was the year with the lowest investments into real estate (CBRE research, 2014). The most favored asset by investors into Swedish real estate was residential properties with offices on the 2d place, whereas in France the most sought for investment market is office one. However, in both cities, the commercial real estate in general has the dominant sector for real estate investments (Savills, 2013). Furthermore, nowadays investors are interested not only in a particular sector of real estate but also in the sustainable characteristics of a building.

During the recent decades the notion of sustainability has been introduced to almost all businesses and business areas. The UN and EU governments have adopted several regulations in order to reduce the emission of gases and decrease the energy consumptions. Sustainability in real estate and particularity in construction has been discussed by many researchers and journalists. The issue of importance of green buildings has been raised also by The World Bank: according to their research, the residential and commercial buildings are producing a great proportion of CO<sub>2</sub> emissions in many countries in the world. Different researchers as well as RICS research connects the emission of CO<sub>2</sub> primarily with the poor energy performance of buildings (RICS, 2014; Tahiri, 2011; Krause and Bitter 2012; Heinzle et al, 2012). In France in 2011, commercial and residential buildings were responsible for 20% of all carbon dioxide emissions whereas in Sweden this percentage is much lower, only 5%. However, in both countries there is a downward trend of CO<sub>2</sub> production related to buildings. These can be seen as a result of implementation of new methods and technologies of construction processes (Malina, 2013).

Moreover, not only many countries have adopted the sustainable construction techniques and started using green building materials but also it has started to be important to have sustainable property management, sustainable real estate valuation techniques as well as on the investment side, there has been a major trend to sustainable real estate investments. Many European financial, consulting and real estate companies like AXA Real Estate, Jones Lang Lasalle, Deloitte or Deutsche Bank offer their clients advises and investment possibilities in green property market.

Sweden has a long history of sustainable development. In terms of sustainability, Sweden has been the ranked 6th country for sustainable business by Forbes in 2012 and the 1st most sustainable country in the world in 2013 in the study of the Swiss investment group RobecoSAM, whereas France is on the 19th place of that ranking. However during the recent years there has been a major trend to sustainability of real estate due to several new EU and local environmental regulations (like Grenelle de l'Environnement in France or Miljömål in Sweden) about the building performance framework for both new and existing buildings (Nappi-Choulet, Decamps, 2012). Moreover, there are more and more different sustainability certifications on the market; part of which are obligatory and other part are voluntary. They

are supposed to have an informative function in order to differentiate a sustainable building from the conventional one in the eyes of future occupiers and investors (Fuerst and McAllister, 2011).

## **1.2. Problem analysis**

In the domain of commercial real estate, more and more companies are interested in green buildings. Both occupiers and investors are getting more and more interested in turning to sustainable real estate by many different reasons.

First of all, there is a trend of socially responsible investments that many companies are trying to follow where the main reason is environmental and sustainability issues (Pivo, 2005; Berry and Junkus, 2012). However, there are other factors that may affect the willingness of companies to choose “green” buildings among others.

From the occupiers’ side, the benefits of green buildings are coming from the improved working environment. This implies the better ventilation, building materials of a higher quality, better lightning (predominantly with the day light with an outdoor view) and thus less energy consumption, better design. These benefits are supposed to contribute to the working capacity of employees and thus increase their productivity as well as reduce costs for the company. Investors, however, are seeking for the opportunities to acquire sustainable real estate in order to benefit from the faster leasing of the space and from the rent premiums (Ries et al, 2006 and Heerwagen, 2010).

many research, it has been recognized that there is still not enough done in order to have a better understanding of the quantitative benefits of sustainable real estate investments (Ries et al, 2006). Moreover, it is still hard to implement the sustainability criteria of a building during the valuation process (Warren-Myers, 2012). This may result into difficulty for investors to choose between a sustainable and a conventional building.

## **1.3. Purpose**

Many real estate companies are interested in investments into “green” properties both in France and in Sweden. The main objective of this thesis is to investigate the main force that drives these investments, whether they are driven by personal consciousness of investors, by the overall market trend or by the premium that they may receive from the sustainable investment. The purpose is to better understand the reasons behind the green real estate investments as well as to investigate the difference in value of certified sustainable real estate and its impact on the investment decisions.

## **1.4. Research questions**

The examine of research questions will permit to benefit from the information that will be gathered about the value of sustainable real estate in France and in Sweden as well as it will help to understand the motives for these kind of investments and benefits from them.



The following questions will be researched in this thesis:

- What are the main reasons for companies to invest into sustainable real estate? What are the main sectors of sustainable real estate investment in France and in Sweden?
- What is the premium that investors are expecting from sustainable buildings?
- What is the difference in value of sustainable buildings with different certifications?

### **1.5. Thesis disposition**

This thesis is structured in five chapters.

The first section will explain the methodology applied for the research. It will as well present the choice of questions for interviews and collection of empirical material.

The second chapter will present a review of the existing literature connected to the scope of this paper. Several important theories will be discussed in this part, including theories about investment decisions, real estate investment and sustainability.

This will be followed by an empirical section with the presentation of the real estate investment market in Sweden and in France as well as presentation of findings from the survey.

Next section will concentrate on the analysis of the findings according to the relevant literature.

Conclusion and suggestions for further research will present the final part of the paper.

### **1.6. Delimitations**

This thesis is limited to commercial real estate investment market in Europe, in particular to real estate markets in Sweden and France as well as this paper will consider primarily the value of sustainable buildings for investors and not for occupiers. Moreover, this paper is going to take into account only several general green building certification systems, which are widely used in both countries and in the world, hence it does not consider several specific green building certifications and programs.

Qualitative interviews will be held mainly with the experts and advisors in real estate consulting companies who have been in contact with investors interested in sustainable real estate. The number of interviews directly with the investors will be limited due to the restricted time of the study as well as due to the difficulty for the people in these companies to find enough free time for it.

Also, due to the limited time and volume of the study, the priority in this research will be given to the direct real estate investment and not both direct and indirect investments.

## **2. Methodology**

### **2.1. Choice of methodology**

There are two approaches to data collection: quantitative and qualitative. Quantitative research consists in making questionnaires or surveys with structured questions and with their help to ask as many people as possible to answer these questions. The conclusions from this research can be done in numbers: like percentages or averages (Ghauri and Gronhaug, 2010; Myers, 2009; Flick, 2009).

The other type of research- qualitative research is more focused in deeper understanding of the subject in question and it provides more explanations of the findings. The data is collected in a less structured manner; this research can be pursued through interviews with open-ended questions, field studies, case studies as well as observations. The strong side of this research is its ability for in-depth examination of a topic (Myers, 2009; Flick, 2009).

For the following thesis the qualitative research will be used the most since its purpose is to get a better understanding of the motivation of companies to invest into sustainable real estate. However, quantitative data will be applied as well in from of amount of investment transactions in different real estate sectors, repartition of types of investors, number of sustainable buildings with different certifications, etc.

### **2.2. Data collection and analysis**

Secondary data for this thesis was gathered from the websites of different real estate investment and consulting companies like CBRE, DTZ, Savills, KPMG and PwC. These companies possess a vast and reliable database of research about investments into real estate and sustainability. Moreover, secondary data about sustainable legislation was taken directly from the websites of governmental bodies of respective countries. Also, the information about sustainable certification was gathered from official webpages of companies who are in charge of those certificates.

The primary data collection has been done through semi-structured in-person interviews with employees of real estate consulting and construction companies in France and in Sweden who have been in direct contact with investors interested in sustainable properties. The choice of these companies as a source of primary data is justified by the fact that they employees have been working with different investors on French and Swedish markets and thus possess a lot of unified information about different investors and their investment strategies and interests.

Companies that have been chosen for interviews are large consulting and construction companies in France and in Sweden who possess or were advising in acquisition process of sustainable real estate in these two countries. The research is narrowed down to 4 companies due to the limited time of the study as well as inability to connect with many real estate companies in a short period of time. The interviewees were selected according to their job duties and connection to sustainable real estate investments processes and the interviews were scheduled either by emails or by personal contact.

The analysis of both secondary data and interviews was done with help of chosen theories.

### **2.3. Interview questions**

Most of information for this thesis is gathered from interviews and investment and real estate companies' research connected to the topic of this thesis. There are three types of interviews: structured, semi-structured and unstructured. The first type of interviews contains short standardized questions which can be answered briefly by the interviewee and which allows the interviewer to write down the brief answers. In contrast to structured interviews, the unstructured ones take longer time and are held in a form of a free discussion about the research topic. These interviews do not require a lot of prepared in advance questions, however the interviewer needs to have a lot of knowledge about the subject in question in order to get sufficient information. The compromise between these two interview types is semi-structured interviews. In order to make this type of interview, the person prepares in advance a set of open ended questions which can lead the in-depth discussion (Flick, 2009 and Bell, 2009).

In the previous section it has been mentioned that semi-structured interviews were chosen. This choice was motivated with the type of research, which wants to get an in-depth examination of a topic. A set of open ended questions was prepared in advance. Since the interviews were made in French and in Swedish these questions were made in both languages however an English version was also created (see Appendix 1).

### **2.4. Reliability and Validity**

Reliability and validity are important for the scientific research. The concept of reliability concerns the degree to which the data of the study can be trusted. A reliable study is the one which gives same results regardless of the conditions in which it was made (Bell, 2005).

Validity is another important measure of a good research. It is ascertains the consistency of conclusions of the research. It makes sure that the conclusions are logically derived from the study. The validity and reliability are two concepts that are not completely mutually inclusive-when the research lacks reliability it cannot neither be valid; however, when the research has high reliability, it does not a priori imply a high degree of validity (Bell, 2005).

The following research tried to meet those two criteria in a best way. Since people who were interviewed are working in different departments and in different companies, it provides with different insights for the same topic and thus gives a rise to reliability criteria. The validity criteria are met by making the structure of the interviews connected to the research method and theoretical background of this study.

### **2.5. Ethics**

The following thesis has followed the ethical rules of the research. "Research ethics can be defined as the application of moral principles in planning, conducting, and reporting the results of research studies" (Myers, 2009, p.45). Some examples of an unethical scientific

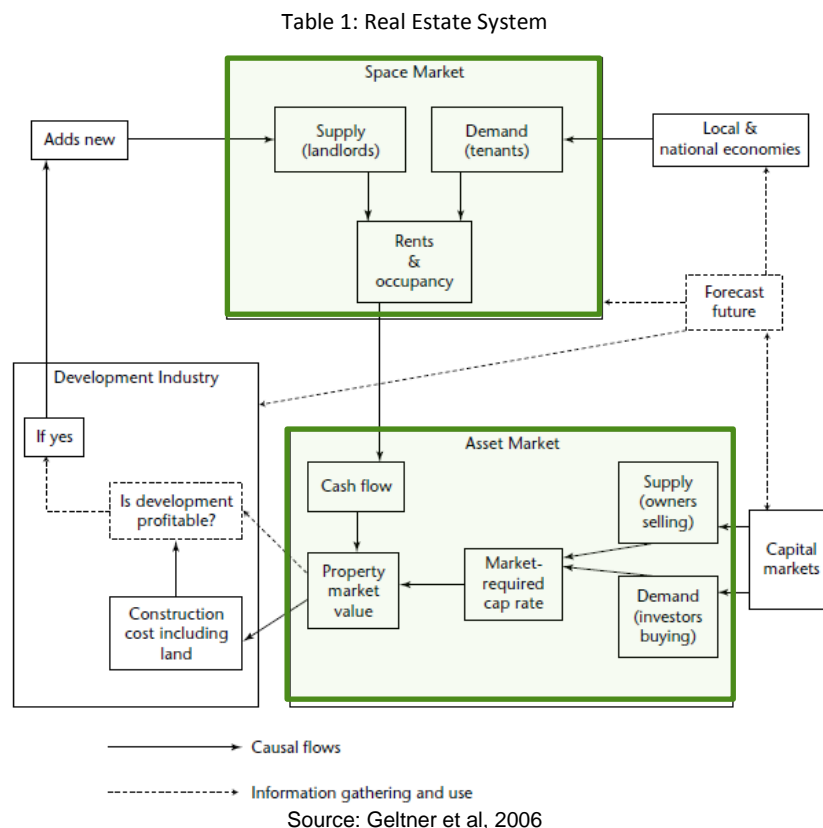
behavior are fabrication and falsification of data as well as plagiarism. All these misconducts have been avoided in the present research. Moreover, the code of beneficence was applied: the present paper provides benefits not only for the researcher as well as it provided the equal treatment and respect of all interviewees (Flick, 2009). Also, the study used the concept of informed consent- the interviewees were given all information about the study in advance as well as they were asked the permission for the use of their data as well as all names of respondents have been hidden in order to protect their personalities (Myers, 2009).

### 3. Theoretical Framework

Real estate is one of the major investment asset classes. The real estate has been gaining interest of investors as a mean to diversify their investment portfolio during recent years (Geltner et al, 2006; Kolbe et al, 2013 and Georgiev et al, 2003). Despite the recent economic and real estate crisis, the real estate market has started to improve and although the amount of investments has not yet reached the pre-crisis level, it has increased a lot. According to the recent research, this movement can be explained due to improving economic conditions in Europe (CBRE, 2014; DTZ, 2014 and Savills, 2013).

#### 3.1. Real estate market

In order to pursue with the sustainability issues in real estate market it is firstly important to understand its components. Real estate market is divided into two parts: asset and space market. These two markets are influenced by the development (construction) industry, capital markets as well as the economic situation in the country/city.



Space market or rental market is the market of the “usage of real property” (Geltner et al, 2006, p.3). On the demand side of this market there are people and companies who want to rent a space for different activities and on the supply side there are property owners who are looking for tenants. In the space market the location of the property is very important, since users are usually looking for a property with specific characteristics in a specific location.

This also leads to the segmentation by location and by property type. The location segmentation divides the real estate market into different submarkets, like central business district (CBD) which is very attractive for its office supplies; logistics areas, factory areas, different housing areas (for low income households and for high income). Another division of the real estate is by property type: commercial (office, retail, industrial, etc.) and residential. These divisions influence on the rent prices which depend on the property attractiveness. The building construction costs do not differ much depending on location thus it is the land scarcity and attractiveness that drives prices up and people are willing to pay more for the premium location (Geltner et al, 2006 and O'Sullivan, 2012).

While looking at the real estate asset market, the location here is less important. Is it a market where on supply side there are property owners who want to sell their real estate and on the demand side there are investors who want to buy it and who are interested mainly by the future cash flows that the property can produce. In this market the location is secondary. According to Geltner et al (2006:14), "within this overall general valuation context, the specific values of individual properties or buildings is determined by the perceptions of potential investors regarding the level and riskiness of the cash flows that each individual property can generate in the future" Apart from risk, another factor that affects the price of the property on the asset market is the rent growth potential.

Geltner et al (2006) present another important variable that affects the supply, demand and prices on real estate market which is a vacancy rate. It is a percentage of non-occupied buildings among all the building stock which actually reflects the balance between supply and demand on the market. This percentage can vary depending on the industry however there is always a so-called natural vacancy rate on the market. When the vacancy is above the natural level, this implies that there are many real estate offers on the market which leads to the decrease in the rent level and on the contrary.

While in the space market investors are looking for the specific place of the building, in the asset market they are more interested in the specific asset type. There are four main classifications of asset types in the real estate market: core, core plus, value added and opportunistic (KPMG 2012). Core assets are represented by low risk secure assets, in prime locations and with permanent and sure cash flows. These are the assets that have no vacancies, permanent tenants in are situated in a stabilized market. Core plus assets are still quite secure assets but they have a room for development. Thus, they are a bit riskier than core assets, and thus having higher return rate. Value added assets are even riskier and thus have higher return. They may need some improvement and which are not fully leased, however they have a good potential. The last type of assets- opportunistic, have the highest return on the investment due to the high risk they bare. These assets often have high vacancies and need an additional investment after the purchase (KPMG 2012).

Depending on the strategy of the investor and on its level of risk acceptance there are different equity debt combinations possible. For example, for core assets the debt or leverage percentage is quite low, below 30%, for core plus the leverage can reach up to 50% of the acquisition amount (Geltner et al, 2006). Value added investments are usually considered to have a moderate leverage of around 50-70% while the opportunistic assets have the lowest equity investment and the highest leverage- more than 70% (Geltner et al, 2006).

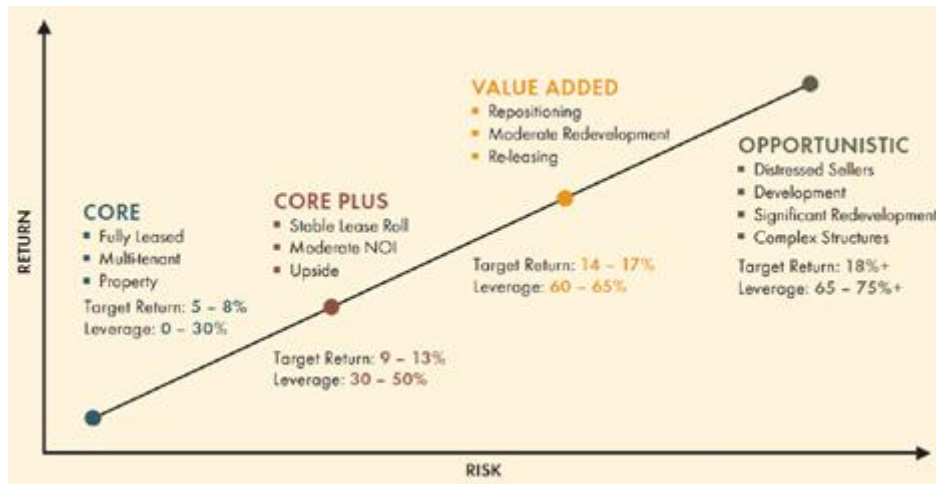


Figure 1: asset classification  
Source: Metropolitan Real Estate

Both asset and space market presented above is affected by sustainability issues which are becoming more and more important. On the space market the occupiers are looking for sustainable buildings since according to the research it increases productivity of workers as well as reduces the costs for building maintenance (Heerwagen, 2000). Moreover, sustainable buildings have less vacancy periods and higher occupancy despite the higher rents which in turn affects the income of owners on the space market and the ability of selling or renting out the space faster enhances the interest of owners in sustainable real estate (Heerwagen, 2000). Also, the ownership or rental of a sustainable building corresponds to the CSR (corporate social responsibility) issues of companies that play an important role in modern business conduction: by devotion of money to sustainability companies show their CSR commitment (Coombs and Holladay, 2011).

On the asset market, first of all sustainable properties interest the investors due to the recent trend of SRI (socially responsible investments) which is a consequence of the CSR obligations of companies (Geiger et al, 2013). Jansen (2013:101) writes that although this investments require more money, they cannot be considered as altruistic: "socially responsible investing is a combination of commercial business investments, seeking a satisfactory rate of return with a substantial "social" component". However, some authors argue that social trend in investments does not produce enough benefits to cover the costs (Baker and Hofsinger, 2012). Despite the critics, there are many arguments that support the investments into sustainability. First of all, it gives a better reputation for the company; second, these investments into real estate are risk adjusted for environmental risk as well as they are more fit for the new environmental legislations. Moreover, the energy cost reductions should be also taken into consideration (Baker and Hofsinger, 2012).

Sustainability issues are starting to affect the lenders as well. Although it does not have a big effect yet on the lending schemes, there are already several banks who are turning to sustainability in their real mortgage schemes and terms (PwC, 2014). A more profound explanation of the sustainability effect on real estate market will be presented in the next chapter.

### **3.2. Sustainability in Real Estate market**

During the recent years, the interest in environment friendly buildings has increased. There have been issued several environmental regulations in the European Union as well as many European countries have adopted their own environmental objectives. This situation has also affected investors and their way of doing business since they can benefit from several incentives while investing or using a sustainable property (for example from taxation benefits or government subsidies) (Geiger et al, 2013).

More and more companies are focusing on the “green” real estate (Geiger et al, 2013, Temmink, 2010, Nappi-Choulet and Decamps, 2013). There are several opinions about this investment behavior. Geiger et al (2013: 75) suggest that these investments are caused by the fact that investors are looking for additional profitability for their money. They emphasize that although “an important factor behind the growth has been ethical consumerism, with investors paying a premium for products that are consistent with their personal values” and that investors are interested a “positive intrinsic value of sustainable properties”, it is a myth that investors would sacrifice a part of their money and their future profit in order to invest into a green asset. Other researchers, Martin and Gossett (2013) argue that in green buildings, tenants are getting more benefits than owners. They give an example of energy efficient building, where the owner would be responsible for energy efficiency improvements and tenants would benefit in terms of energy and thus money savings. While presenting a visible interest for occupiers, sustainable buildings usually have higher rents and higher occupancy which can be interesting for the investor (Martin and Gossett, 2013).

Despite the rent premium of “green” real estate, investors face a high value of such asset. While being already a costly asset, sustainable real estate can present a barrier for investors due to scarcity of private resources and limited access to the leverage. These factors can play a preventive role in socially responsible real estate investments (Nappi-Choulet and Decamps, 2013 and Martin and Gossett 2013).

It has been mentioned briefly before that more and more banks and investment companies offer investment strategies and advise into sustainable portfolios and direct assets. Many of them emphasize on the presence of ecological certifications in their assets. These certifications (both voluntary and compulsory) enable people to distinguish between different types of products and mainly serve as a reference point to occupiers or investors about the level of sustainability of a building which helps to influence a “greener” consumption pattern (Geiger et al, 2013 and Fuers and McAllister, 2011).

In order to see how the sustainability of buildings can influence the consumption pattern of investors, it is important to take a look at the process of decision making which precedes the actual investment, which will be described in the following chapters.

### **3.3. Real estate investment decisions**

Before looking directly at the decision making process it is first of all important to define what are real estate investments and its types.



Real estate investments can be divided into two categories: one category implies debt financing and the other- equity financing (Kolbe et al, 2013 and Georgiev et al, 2003). These two categories can be in turn divided into direct and indirect investment. From the equity side, the direct investment implies purchasing a real property and managing it by making own decisions, these type of investors are “active investors” (Kolbe et al, 2013:7). Another type of investments that has been mentioned is indirect investment. This implies that the investor purchases shares in companies who hold real estate assets, these investors are called “passive” (Kolbe et al, 2013, p.7). From the debt side, an active investor is an investor who issues mortgages (like banks) or acquires loans on mortgage markets. In difference to active investors, passive real estate debt investors are companies as mortgage real estate investment trusts (ex: Blackstone Mortgage Trust), who “invest in mortgages rather than, office buildings, and they do so mostly with borrowed money” (Birger, 2012: 35). In addition, investors can also differ in their investment objectives. One type is the growth objective, which implies a long-term investment without the intermediary cash return. Another type is the income objective, where the investor is looking for intermediary cash payments (Geltner et al, 2006).

Despite the type of an investor, the process of real estate investment decision making is the same for all of them and similar to the decision process for other investment. According to Kolbe et al (2013) and Geltner et al (2006), the first step in this process is estimating the future cash flows from the investment, since the goal of investment is to benefit from the ability of a real estate to produce income. The following step that they mention is adjustment “for timing differences among expected streams of benefits flowing from investment alternatives” (Kolbe et al, 2013:13). Investors are valuing higher the asset which can produce income sooner than other assets. The last main step in the decision making process is to determine the level of risk that is attributed to the asset. The more alienated is the return of the investment from the investment decision, the less is the value of a property since it becomes more risky. Investors are usually risk-averse, that is why they expect a higher final return on a riskier asset (Kolbe et al, 2013 and Geltner et al, 2006).

Although decision process is the same in the theory, it can differ in practice. According to French (2001:400), the theory of decision making is “the study of models of judgments involved in, and leading to, deliberate, and usually rational, choice”. He describes two types of decision models: descriptive and normative. The descriptive model takes a look on the actual process of decision making whereas normative looks at the theory of decision process. He suggests that usually the outcome of the decision process is different to what they have assumed in the beginning.

### **3.4. Criteria for real estate investment choice**

Although being considered as a good investment for the portfolio diversification, real estate is still a risky and complicated investment. Many factors can influence the choice of the investment during the decision making process (French, 2001; Geltner et al, 2006 and Kolbe et al, 2013).

One important criterion that investors should consider is the liquidity of the asset, whether it will be able to sell it without problems in a limited period of time and without the loss in its value. Another important consideration is the size of the capital that will be needed to proceed with the investment and how fast the additional capital can be obtained if needed (Geltner et al, 2006).

Tang and Li (2009) in their research summarize several important financial criteria that one should look at in order to pursue to the investment decision process. Among others they mention the following factors:

Table 2: financial criteria for investment decisions

<b>Financing method</b>	Capital cost Fund using time Financing difficulty
<b>Investment type</b>	Market demand IRR Business management requirement
<b>Macro-control</b>	Industrial policy Finance policy
<b>Investment risk</b>	Solvency Investment breakthrough rate
<b>Location and environment</b>	Commercial prosperity degree Traffic condition Supporting infrastructure Land-use restriction Environmental superiority degree

Source: own illustration

However, these researchers also argue that although the financial indicators are very important, other factors like economic, social and environmental should be taken into account as well. Frank et al (2013) also point out that the main criteria that companies take into account for selecting their investments are purely economic and if they do incorporate any qualitative criteria, they usually do not have any solid support to validate the importance of it. Apart from economical gain, long-term competitiveness of the investment as well as perception of internal and external clients about the investment should be considered as investment selection criteria (Frank et al, 2013). Furthermore, legal environment and taxation system have a great impact on the choice of investments since it has a direct impact on property prices (Fereidouni and Masron, 2013).

**3.5. Real Estate Investment analysis and value**

Since real estate investments are generally directed to the absorption of the financial benefits that the real estate can generate in the future, before proceeding to the purchase, the investor is interested in return on the investment capital, the future cash flow and marketability of the asset, liquidity of the asset and the ease of renting it out. Thus, the investment analysis is an important step before proceeding to the investment itself.

One important step in this process is estimation of the value of the investment and its financial performance (Kolbe et al, 2013). Real estate valuation is important for the investment analysis in order to check the fairness of the purchase price and to estimate the value of an asset on the open market (Geltner et al, 2006 and Green Building Council of Australia, 2008). There are two common financial methods for estimation of the value of a real estate: income capitalization approach and discounted cash flow approach (DCF). Another method that is used for the estimation of the real estate value is the comparable sales approach (Geltner et al, 2006 and Green Building Council of Australia, 2008).

The three methods will be presented together with the formulas for value calculation which will be used later on for the analysis of the impact of sustainability on value.

- *Comparable sales approach*

This method is used only for the estimation of the market value of the property- the value for which it could be sold in the open market at a given time. For this approach, the expert chooses properties that have been sold recently and which have similar characteristics to the target one. These characteristics may include size, location, physical features, sales conditions, etc. These characteristics are adjusted to those of the targeted property and the value is derived from adjusted values of comparables (The appraisal institute, 2008).

Although this approach is relatively simple there are several limitations. First of all, it is hard to find comparable sales for buildings that have some specific features or which serve some special purpose due to the limited number of similar properties thus the valuation can be reliable only on an active market with the significant number of sales (The appraisal institute, 2008 and Fisher and Lousiotis, 2013).

Moreover, for commercial real estate, sales comparison approach is not considered as an appropriate valuation technique. It is said that the comparable sales approach values only material characteristics of the building like its condition, location, etc. and does not take into account the income that it produces. Since income production is the main goal of commercial real estate, the comparable sales method serves more as a reference point for the DCF and income approaches (Moye, 1991).

- *DCF*

This method is the preferred one among many investors. The discounted cash flow method is based on three steps: forecasting future cash flows, setting the required rate of return and discounting future CF with the given rate of return. The forecasting plays an important role in the DCF calculation. Before starting using the DCF formulas, it is important to make a prediction about income, vacancy and different types of expenses that real estate will require. The DCF formula takes into account all the cash flow, together with the final potential value of the property.

The following formula shows the calculation of the value  $V$  of real estate with the DCF approach:

$$\text{Equation 1: DCF approach}$$
$$V = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_n}{(1+r)^n}$$

Source: Geltner et al 2006

The  $CF_n$  represents the cash flow generated by the real estate in the period  $t$  and  $r$  is the anticipated discount rate. The projection of cash flows is usually made on a 10- year basis and thus it is widely criticized due to the inability to predict the future financial results. However, despite this criticism the investors still use the DCF analysis for the investment decision.

The discount rate is consisting of a risk-free interest rate (answers for the time value of money) and a risk premium (a compensation of the risk that is attributed to the uncertainty of the future cash flows):

$$\text{Equation 2: discount rate}$$
$$r = r_f + RP$$

Source: Geltner et al 2006

The purpose of this analysis is to adjust the value of future cash flows to the present time and to compare with the cost of the investment itself. If the discounted value is higher than the cost of the investment itself, it means that the investment has a good potential (Geltner et al, 2006; Berk and DeMarzo, 2011 and The appraisal institute, 2008).

This technique permits not only to estimate the present value of the property but also to check the performance of the property at a desired return rate, which is important for an investment analysis. The two important investment performance indicators which will be discussed further include:

- Net present Value (NPV)
- Internal rate of return (IRR)

The net present value model is the difference between all positive and negative discounted cash flows generated by the property. This criterion is seen to be worthy to look at while taking the investment decision. When the NPV is greater than zero, it means that the property will over perform the initial cost and thus it is worth to proceed with the investment. Consequently, when the NPV is negative, the investment is seen as not worthy. NPV equals zero means that the investment would have neither losses nor gains; and it is up to the investor to decide whether he is interested in this opportunity or not (The appraisal institute, 2008; Geltner et al, 2006 and Magni 2010).

Equation 3: NPV calculation

$$NPV = CF_0 + \frac{CF_1}{(1+r_1)} + \frac{CF_2}{(1+r_2)^2} + \dots + \frac{CF_T}{(1+r_t)^T}$$

Source: Geltner et al 2006

The IRR is the rate of return on the investment that makes the zero NPV. IRR is a return rate that is actually directly associated with the cash flow and although there is no formula that can calculate it, it can be derived from the formula of NPV (The appraisal institute, 2008 and Kocis, 2009). The IRR can be incorporated into the NPV formula in the following way:

Equation 4:NPV calculation with IRR

$$NPV = CF_0 + \frac{CF_1}{(1+IRR)} + \frac{CF_2}{(1+IRR)^2} + \dots + \frac{CF_T}{(1+IRR)^T}$$

Source: Geltner et al 2006

Making NPV=0 in this formula helps us to find the IRR of the investment. However the higher IRR does not mean that the investment profitability is higher. Although, when all factors are equal, the higher IRR signifies the more desirable project. It is also compared to investors required rate of return: if IRR is lower than the project is seen as undesirable (Kocis, 2009; Berk and DeMarzo, 2011 and Geltner, 2006).

- *Direct capitalization*

Income capitalization approach is the second standard method of valuation of commercial property. It looks at net operating income (NOI) and capitalization rate in order to determine the value of the investment.

Equation 5:direct capitalisation

$$\text{Value} = \frac{\text{NOI}}{\text{Capitalization rate}}$$

Source: The appraisal institute, 2008

The difference of this approach with the DCF is that income capitalization looks only at the income of a single year whereas the DCF approach takes into consideration NOI of all years of the property possession by the investor as well as its sales value. The NOI for the direct capitalization method is calculated on the basis of the market information about rents, vacancies and operating expenses (Etter 1994 and Geltner, 2006).

The NOI is an indicator that is used for the analysis of the potential of profit generation of the property. It is calculated as a difference between the potential revenue and expenses of a property. One flow of this indicator is that it does not include the capital expenditure into account which can actually result into an important expenditure made by the company (Geltner, 2006).

The Capitalization rate or “cap rate” is important for the investor since represents the percentage amount of profit that the investor can make from a given real estate (The appraisal institute, 2008). It is used for the value determination is an initial yield of the property, determined by the market and that is used for the conversion of net operating income into the market value of the property. Thus, it can be either extracted from sales of comparable properties or it can be calculated as a ratio between the NOI and the market value of the property (Van Wouwe, 2008 and The appraisal institute, 2008).

The three above listed valuation methods are usually used together in order to get the best value of the property (The appraisal institute, 2008).

However, the valuation of sustainable property can be limited with some of these approaches. The appraisal of sustainable buildings with comparable sales approach can be limited due to the scarce number of sustainable real estate on the current market. Comparable properties should have similar economical and physical characteristics in order to provide the best value assessment. Also, this type of valuation is not used for rare or unusual properties thus it is not worth to be applied for the valuation of sustainable real estate nowadays (Warren-Myers, 2012; Lorenz and Lützkendorf, 2011 and Green Building Council of Australia, 2008).

Despite many researches that have been made, it is still a challenge to incorporate the sustainability criteria into the valuation processes (Babawale and Oyalowo, 2011). However, several sustainability factors are easy to measure and thus relatively easy to include into the valuation process. First, the rents of a building can be higher due to the better environment and the operating expenses can be reduced (for example due to energy savings) (Leopoldsberger et al, 2011 and Lorenz and Lützkendorf, 2011). Moreover, since the sustainable building has less vacancies and higher demand, the yield of investments in such buildings can be higher than those of conventional ones. Although, factors as comfort of environment and design as well as the environmental impact of buildings is hard to measure and consequently hard to include into the value of a building (Leopoldsberger et al, 2011 and Lorenz and Lützkendorf, 2011).

Lorenz and Lützkendorf (2011) suggest that sustainability component can affect the appraisal since it can reduce risk premium of the investment and moreover and increase the net income from the real estate while reducing different types of costs related to the property management:

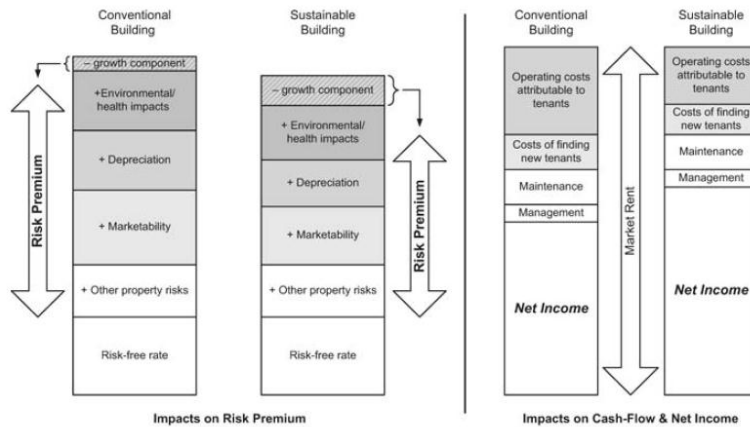


Figure 2: sustainability effects on Risk, Cash Flow and Net Income  
 Source: Lorenz and Lützkendorf, 2011

These factors are important in calculation of the value with the DCF and direct capitalization approaches and thus they can have a direct effect on the valuation processes (Lorenz and Lützkendorf, 2011).

While the DCF and the direct capitalization approaches can be both suitable for the valuation of sustainable buildings, the assessment of value of sustainable buildings with the DCF approach is said to be the most appropriate since it takes into account the greatest number of different factors that affect the real estate value on the market: factors such as rents, capital expenditures, allowances, tenant retention, growth yields, etc (Green Building Council of Australia, 2008).

## 4. Empirical Data

### 4.1. Commercial real estate investment outlook

#### 4.1.1. Sweden

Sweden is an economically stable country therefore it is perceived as a safe and attractive market for investors. According to the study of Ernst and Young, Sweden is a highly attractive country for real estate investments in comparison with other European countries. Their findings show that 96% of investors from different countries that were surveyed would consider investing in Sweden (Ernst and Young, 2013).

The year 2013 has seen an improvement in the labour market, low inflation and weak increase in price of products and services although the production costs were high and demand was relatively low, resulting into difficulty for companies to increase their prices to cover high costs (CBRE Research, 2013).

Sweden's attractiveness as a location for real estate investments in a European comparison

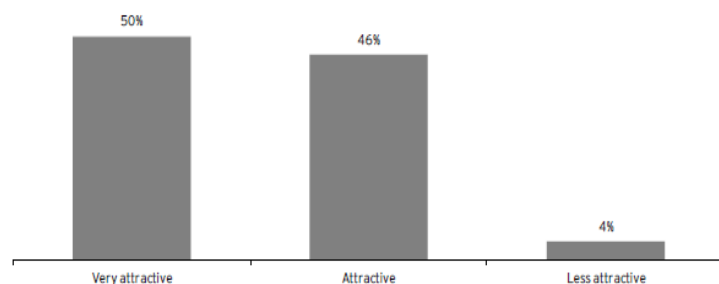


Figure 3: Asset Investment Trend indicator

Source: Ernst and Young, 2013

In 2013 Sweden had the largest investment volumes in Nordic countries, leading with € 9,68 billion of transactions. These transactions were dominated by local buyers, and there was a decline in the share of foreign investments in 2013 (14% in comparison to 20% in 2012). However the share of foreign investments has increased in the fourth quarter of 2013 and since Sweden is seen to be as a stable market, it is predicted that the number of new entrants will increase in 2014

Local vs. Foreign investors

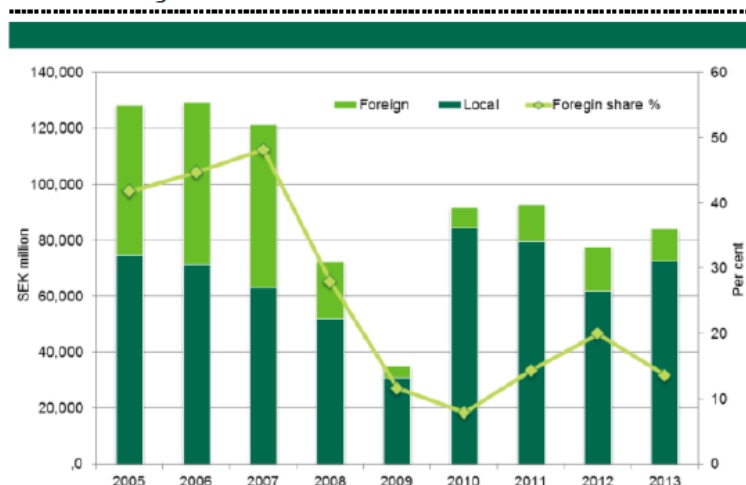


Figure 4: Sweden Property Market View

Source: CBRE Research, 2013

and following years, although, due to the strong national currency (Swedish crowns) and high hedging costs the competition with national investors for some core assets can be relatively weak. (CBRE Research, 2013). After the interview with the representative of a Swedish office of CBRE the following major foreign investors on the Swedish market were identified: the majority of foreign investors are coming from Germany, UK, US and Scandinavian countries like Norway and Denmark.



**Chart 4: Nordic Investment by Sector, Q4 2013**

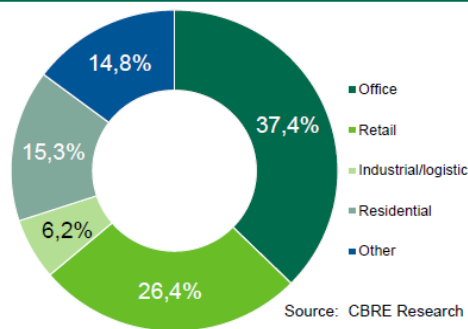


Figure 5: Nordic Investment Market View  
Source: CBRE Research, 2013

The most attractive real estate investment sectors were office and residential (37% and 21,2% respectively) and the interest in relatively risk products (buying vacant buildings or refurbishment opportunities) has increased from both national and international investors although the focus remained on core products and yields (CBRE Research, 2013). Prime yields for office and retail assets in Sweden have been stable since 2012 at 4.5% and decreased for logistics (6,25%) (CBRE Research, 2013).

The most attractive cities for investment in Sweden are Göteborg, Malmö and Stockholm – the fastest growing capital in Europe, generating over 30% of the Swedish economy (PWC, 2012). Prime office rents in Stockholm CBD are almost twice higher than those in Göteborg and Malmö, reaching 4400 SEK/m<sup>2</sup> per annum with the vacancy rate at 4% (while 6% in Göteborg and 10% in Malmö). (CBRE Research, 2013).

For retail, the average prime rent in Stockholm is around 14 000 SEK, although it can reach up to 18 000 SEK for the top luxury locations like Biblioteksgatan. For Göteborg the average prime retail rent is around 12 000 SEK and in Malmö it is the lowest one, around 5000 SEK.

Many big Swedish construction companies have decided to pursue only environment friendly “green” building construction. There are several big commercial real estate development projects in Sweden, the majority of which are being constructed according to the environmental standards (like Mall of Scandinavia in Solna, Stockholm Region; Lyckholms bryggerier offices in Göteborg or Malmö Live offices in Malmö). According to the research of Ernst and Young of investors interested in a Swedish market, these standards are one of the most important criteria for investors in real estate (Ernst and Young, 2013).

A question was asked to the interviewee from NCC, the biggest construction company in Sweden, about the reason they have decided to make all their projects sustainable, whether it was the choice of investors who order the construction or of the market:

*“Normalt sett vet vi inte vem som ska köpa byggnaden när vi börjar utveckla den. NCC har arbetat med miljö- och hållbarhetsfrågor sedan mycket långt tillbaka men marknadsutveckling pekar åt att frågan blir allt mer aktuell.”*

*(Usually we do not know who will purchase the building. NCC has been working with sustainability issues for a long time but the current market development shows that these issues are becoming more and more relevant.)”*

#### **4.1.2. France**

The economic environment of France is less stable than those of Sweden. For the second year the increase in the economy is very low (+0,2%), the unemployment rate grows and the

purchase power diminishes. However, according to INSEE<sup>1</sup> starting from the next year, there should be Improvements in the GDP, household final consumption expenditures and industrial production. As for the real estate, the volume of commercial real estate investments in 2013 has been much higher than in 2012 (€ 15,5 in respect to € 14,5 billion). This trend is believed to be continued in the future, despite the vigilance and cautiousness of investors.

Despite the depressed economics, French real estate market has proved to be strong. Since the real estate crisis, the level of investments was increasing each year. Real estate market has a structural shortage of prime products which are also the most attractive for investors. This situation led to high prices and thus lower yields. Prime office yields in Parisian CBD in 2013 were around 4,25% and for the best retail locations even below 4%. The resulted into the interest of investor in riskier products like products with a good location but potential vacancies or above-market rents or the ones that need renovations.

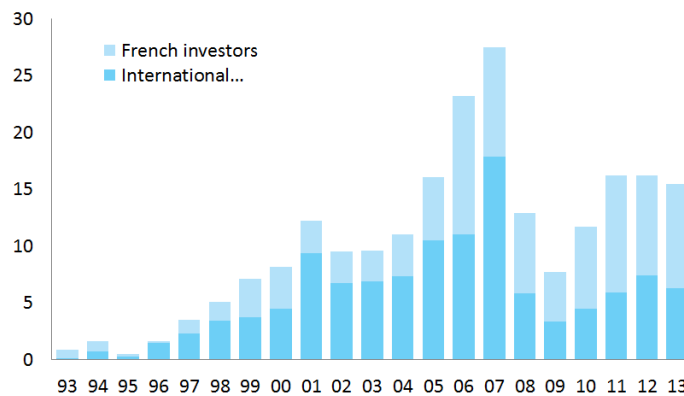


Figure 6: international investors on French market  
Source: CBRE Research

Investments to the retail spaces have been also increasing since 2009, despite a slow decline in 2011. The focus in this sector is mainly on shopping galleries in city centers and shopping centers. While the interest in retail was increasing, logistics sector has been relatively stable with the strong demand, due to the high yields in France in comparison to other European countries, which especially interest foreign investors.

The level of international investors has decreased since the real estate crisis in France however they still represent around 40% of all commercial real estate investments with the majority coming from North America, Germany, Great Britain, Middle East and Asia.

#### 4.1.3. Investors

The type of investors who are active on the French and Swedish market differs not only by nationality and level of money spent but also by their corporate structure. The majority of investors into the Swedish real estate market are REITs, closed-ended real estate funds ( ex. CBRE Global Investors) as well as insurance companies or pension funds. On a French real estate market, closed –ended real estate funds are active as well although other major

<sup>1</sup> INSEE- French National Institute for Statistics and Economic Studies

groups of investors differ from Swedish ones. Sovereign wealth funds and banks are other two big groups of investors on a French market (Ernst and Young, 2013).

Concerning the investors who are interested in a purchase of sustainable property on a French market, from the interview with an employee of a French office of CBRE, it was identified that there is an equal repartition of interest in sustainable investments between foreign and local investors. It was also identified that non-European and investors are less interested in the sustainable buildings that those from Europe, they are more interested in the return of their investment and thus, if a sustainable building will prove its superior characteristics (moneywise) they will be interested to invest.

Also, a question was raised whether there is still an option to invest into a non-sustainable new building nowadays, since many construction companies are turning all their projects into “green” ones, which have sustainable certifications. According to one of the interview respondents, there are still many constructions that have no relation to sustainability. They are not harmful for the environment but they do not have any certification or environmental qualities. The sustainable construction is more popular in the big cities, thus if an investor does not care about the environmental performance of a building (and there are still some), there is no problem in doing so. For example, in province, there are few or almost no buildings with environmental characteristics.

In addition, despite the recent trend into the sustainable investments, according to one of the employees in a French real estate company, there are still many investors that are more interested in their costs rather in the level of sustainability of the building.

## **4.2. Environmental certifications of commercial buildings**

There are many different certifications that are used for measuring the environmental performances of buildings, however in France and Sweden the mostly used are HQE, BREEAM, LEED, Green Building and Miljöbyggnad. The German certification DGNB is also very common on the European real estate market, and it will be discussed briefly, however, it is not present at the moment in the chosen countries.

### **4.2.1. HQE (France)**

The HQE (haute qualité environnementale or high environmental quality certificate is a national French certification which has the objective to evaluate environmental performances, energy performances, health and comfort of the building. It has been created in 2005 and is the predominant green building certificate in France which permits to asses and certify new or reconstructed buildings as well as there is a possibility for companies to get a HQE exploitation certificate (CBRE 2013, Certivea):

The certification process is quite complex and it consists of 3 audits of the construction process (during the project development, design and realization phases), 2 confirmations of compatibility with the label during the phase of studies of a project and construction process as well as one visit on the construction site ([www.certivea.fr](http://www.certivea.fr)).

In order to be certified as HQE the building should meet 14 targets (see Appendix 2). These targets are evaluated according to 3 performance levels: basic, efficient and very efficient and in order to have the building certified as an HQE, it is important for the company to have at least 3 targets as very efficient and 4 targets as efficient. Moreover, the efficient and very efficient should be the targets which constitute the priority for the enterprise meaning that they would vary from company to company. This certification has been recently translated into English but it is still not that wide spread outside of France.

#### **4.2.2. Miljöbyggnad (Sweden)**

A Swedish certification system which bases on Swedish construction and governmental regulations. The certification targets new and existing buildings which should meet the criteria of energy efficiency, healthy inner environment and sustainability of material used for construction- 14 indicators in total (see Appendix 3). Each criteria can get one of four grades: certified, bronze, silver and gold which are summed up to get the overall grade of the building.

During the certification process there are 2 to 3 paper audits of the building before the building is certified. This can be followed by the verification of the certification (for new construction and re-construction). This certification is valid for 10 years from the moment it was granted.

In comparison to HQE, which is a national French sustainable building certification but has been translated in order to become more international, Miljöbyggnad is specifically developed to follow Swedish environment conditions. This certification can be used for new and existing buildings from different sectors (SGBC.se).

#### **4.2.3. DGNB (Germany)**

The DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen/ German Society for Sustainable Buildings) system is used for certification of new and existing buildings as well as the whole urban areas. It is used in several countries in Europe as well as in China and Thailand. The building assessment is done through 50 different criteria with 10 points maximum awarded for each criterion. All the gathered points are translated into the percentage and depending on this percentage the building can get 4 types of certifications: certified, bronze, silver and gold. This certification is one of the main systems in Europe, however, it will not be considered in this thesis since it is not applicable in the researched countries.

#### **4.2.4. BREEAM (UK)**

BREEAM (Building Research Establishment Environmental Assessment Methodology) is a British based certificate which has been existing since 1990 and widely used in Europe nowadays. This certification is based on 9 topics which consist of 117 credit points (see

appendix 4). After the evaluation, the building can get 5 grades: 'Pass', 'Good', 'Very Good', 'Excellent' and 'Outstanding'.

The difference of BREEAM to HQE is that it adapts to the regulations of different countries. For example, in Sweden, Green Building Council has adapted BREEAM system to the Swedish conditions and since 2013 in Sweden is used the adapted version BREEAM-SE.

Moreover, BREEAM certification can be used for different construction projects: from development to refurbishment. The following certifications exist: BREEAM new construction, international, in-use, refurbishment, communities and BREEAM with national schemes.

The process of certification is also simplified in comparison to HQE. There are 2 paper-based audits and the visit of the building is not obligatory.

#### **4.2.5. LEED (US)**

Like BREEAM, LEED (Leadership in Energy and Environmental Design) is a point-based certification with 8 main targets each of which has several sub-themes and 110 total points to achieve (see Appendix 5). In order to achieve the highest grade, the building should get as many points as possible. The grading system has four levels: classified, silver, gold and platinum.

This certification is tailored to the US market and the US norms which make it complicated to translate it to other markets, for example in Europe. However it is suitable for the countries other than European who do not have their own sustainable certification system, for example China, Brazil and in the countries of middle-east (Bureau Veritas, 2012).

This type of sustainability assessment can be used as for new construction so for the existing buildings of different kinds. Moreover, as a difference to HQE and to BREEAM it can be used not only for commercial real estate but also for family homes (USGBC.org).

#### **4.2.6. GreenBuilding (EU)**

This program has been launched in 2005 by the European commission which focuses on the improvement of energy efficiency of commercial real estate in Europe. It is not a certification but a partnership between the company- owner of a non-residential building and the European commission.

In order to obtain the status of green building partner, the company has to follow 4 steps. First step is an evaluation of the energy performance of the building, which is followed by the presentation of the scope of the environmental commitment of the company which should be approved by the EC. When the plan is approved, the company gets the status of the partner and can pursue to the implementation and execution of the plan (EC, 2012).

In comparison to the certifications mentioned above, there is no grading system; however, the building gets a right to use a special logo of the Green Building program.

From the picture below we can see the number of LEED, BREEAM and HQE certifications for existing buildings in Europe, including Sweden and France:

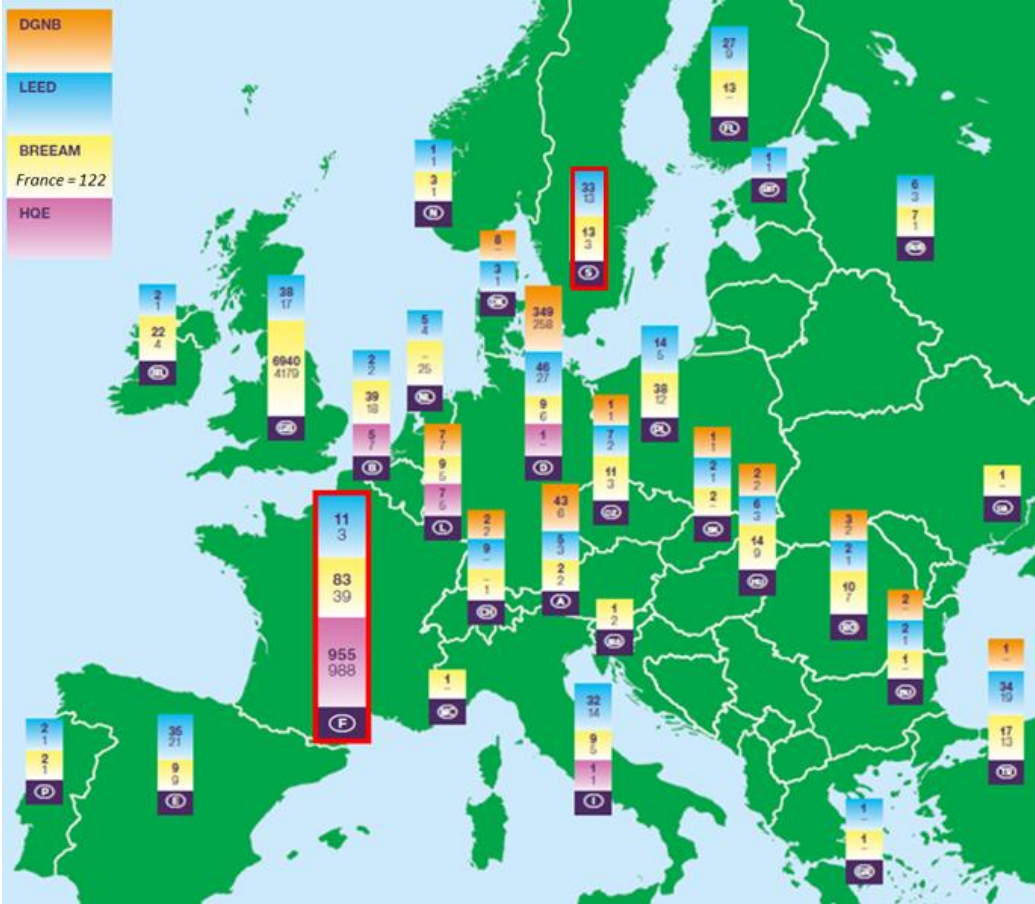


Figure 7: Building certifications in Europe  
Source: RICS, 2012

According to the interviews with the representatives of two different companies and also to the map above, the majority of certifications in France are the HQE certifications. The reason for that is that the HQE certification has appeared in France earlier than any other as well as it has been made according to the French standards. However, more and more buildings are getting BREEAM and LEED certifications nowadays. This trend is due to the constant presence of international investors in the French real estate market as well as due to the trend of the companies for investments into green buildings. Moreover, it is becoming widespread that the building has several certifications. The interviewees admitted that this trend comes from the international interest in the French real estate. It is easier to international investors to understand the benefits of the green building when they are aware about the certification that it has.

Also from the interviews it has been found that the majority of the certified sustainable real estate is located in big French cities like Paris, Bordeaux, Lyon, and there is almost no sustainable commercial real estate in smaller provincial cities in France.

An interesting topic that was discovered during the interviews is that many companies have in their corporate schemes the need to occupy or invest into green buildings. Moreover, some international investors are even looking for some specific certifications, for example,



some American companies are interested only in LEED buildings. In contrast to these investors, there are other who are either not having any preference in the certification or which are not interested at the sustainability level of the building.

In Sweden, BREEAM and Green building projects are dominating all the other certification projects. One of the major Swedish construction companies NCC has decided to develop all its commercial buildings with BREEAM. In addition, since a long time NCC also certifies its buildings with Green Building. A question was asked about the reason for the choice of these certification to the representative of the NCC. The answer was:

*“Green Building började vi jobba med innan de andra systemen hade introducerats på den svenska marknaden. I dagsläget använder vi det primärt för att vi tycker att det är ett bra namn som attraherar våra hyresgäster. Vi har velat ha ett internationellt miljöcertifieringssystem som vi kan använda på samtliga marknader där vi utvecklar kommersiella fastigheter så Miljöbyggnad var inte ett alternativ. Vi säljer också många fastigheter till internationella investerare som känner igen de internationella miljöcertifieringssystemen. Vi har valt BREEAM framför LEED för att vi tycker det är bättre system som är utvecklat ur en europeisk byggtradition och byggnorm. Det är förstås en mycket stor fördel att det nu finns en svenskanpassad version av BREEAM (som även lyft in några av kraven i Miljöbyggnad) som är på svenska (vilket är en stor fördel i byggprojekten). Vidare tycker vi att det är positivt att det är mycket svårare att nå upp till de högre certifieringsnivåerna i BREEAM än i LEED.”*

*(We started working with Green Building before the other systems were introduced on the Swedish market. In the current situation, we use it primarily because we think it is a good name that is attractive to our tenants. We wanted to have an international environmental certification system that we can use in all markets where we develop commercial properties so Miljöbyggnad was not an option. We also sell many properties to international investors who recognize the international environmental certification systems. We have chosen BREEAM instead of LEED because we think it is better system that is developed from a European building tradition and building norm. There is of course a very big advantage that there now is a Swedish version of BREEAM (which also takes into the consideration some of the requirements of Miljöbyggnad), which is in Swedish (which is a big advantage in construction projects). Furthermore, we think it is positive that it is much harder to reach the highest levels of certification in BREEAM than in LEED.)*

Another Swedish interviewee admitted that for the international investors are mainly interested in BREEAM and LEED certificated buildings. While international investors are looking for particular certifications, local investors do not have a special preference for any type of certification. Also, from the information about the certification of existing buildings that was obtained from the Swedish office of CBRE, already in 2012 Sweden had twice as many LEED existing buildings certifications as France (around 100 against 50 respectively) as well as LEED certification was dominating among all other existing buildings certification in Sweden. Whereas in France, BREEAM certifications were more used for this kind of projects.

The map below shows the allocation of different BREEAM certifications (BREEQM-SE excluded) in Sweden and France from the year 2008 and onwards. The majority of certifications in Sweden are at the moment in the big cities like Göteborg and Stockholm. In France, the most of the certifications are in Parisian Area, Toulouse and Marseille.

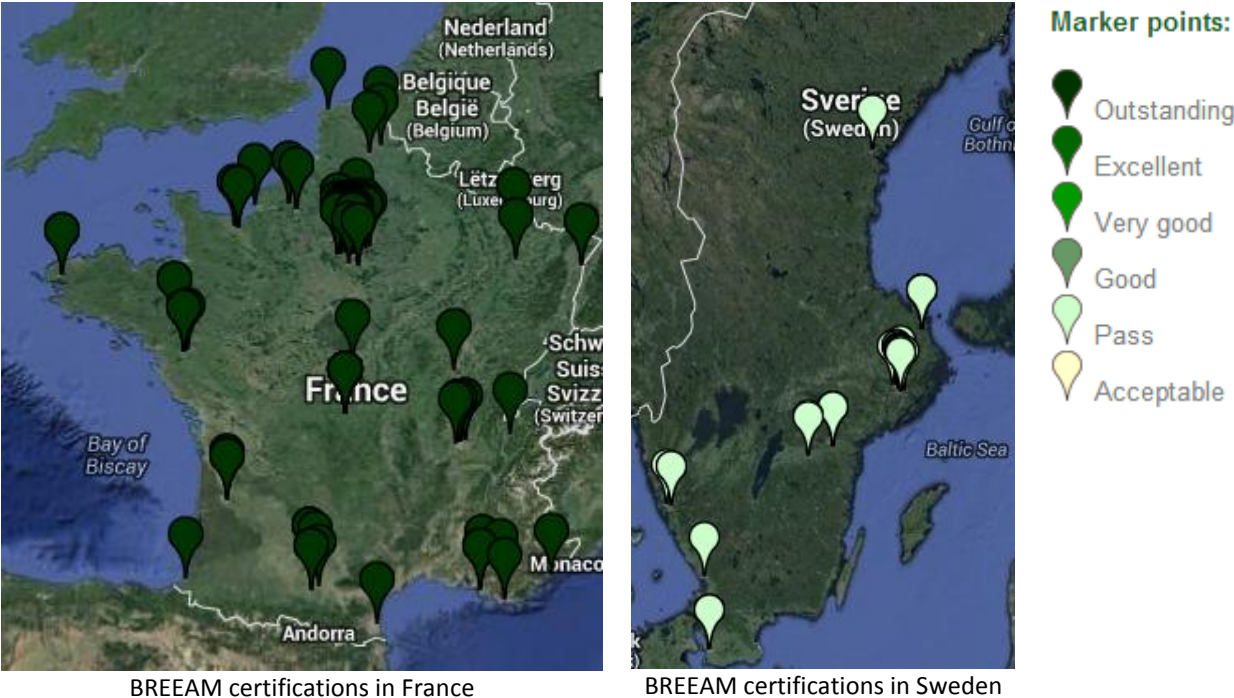


Figure 8: BREEAM certifications in Sweden and France  
 Source: greenbooklive.com

**4.3. Laws and regulations**

It has been mentioned previously that there are several laws and regulations connected to the ecological qualities and performances of buildings. The main local regulations that affect the real estate market in France and in Sweden are Grenelle Environnement and Miljömålen respectively.

The French Grenelle Environnement combines different environmental regulations in different sectors: energy, agriculture, transport, construction, etc. The regulations that are applicable for the real estate and construction sector are directed mainly to the reduction of the energy and water consumption, better waste management as well as the use of the clean construction materials for new buildings and the restructuring of the buildings containing non healthy materials (i.e. asbestos, radon, lead, etc.). Moreover, for new buildings, construction companies should present the energy performance assessment of the future building in order to obtain a construction permit (Ministère de l'écologie, du développement durable et de l'énergie, 2010 ; law n° 2009-967 of 3 August 2009).

During the interview with one of the employees in CBRE France, another important factor that may have an effect on the willingness of investors to acquire sustainable real estate was brought up in the discussion. This is a decree about transparency obligations of companies about their social and environmental politics (Décret n° 2012-557 du 24 avril 2012 relatif aux obligations de transparence des entreprises en matière sociale et environnementale). Among



others, the company should present the sustainable use of the resources in its possession, for example energy performance, water and waste management.

The alternative regulation in Sweden is presented by Miljömål, the goal of which is to reduce the impact of human productivity on the environment by 2020. It is a sustainability target of the Swedish parliament directed to improve and sustain the ecological situation in 16 different areas and the construction sector is one of them. A lot of emphasis is put on the energy performance of buildings, since it is one of the biggest consumers of energy in Sweden. Another important target is as well a better waste management, since it can be better used as a resource. The supervision of the fulfilment of environmental strategies is divided between different governmental bodies like Riksdag, Government, Swedish Environmental Protection Agency and Municipalities.

#### **4.4. Green Leases**

Green Leases are becoming popular in the real estate world. Many big construction and investment companies like Aberdeen Asset Management, Unibail Rodamco, Vasakronan, NCC, Bouygues Immobilier etc. propose green leases for their clients. The difference of the green lease from other leasing contracts is that it contains the information and guidance about the energy use and supply, waste and water management, cleaning, etc. Moreover, it provides the financial incentives for both landlord and the tenant in terms of secured cost reductions and for the landlord- the security that the occupier of the property will have a “green” behaviour and thus the building will keep its sustainable characteristics.

In France, the law Grenelle imposes a significant reduction for at least 25% of energy consumption for the commercial buildings as well as, according to this law, all leasing contracts for buildings over 2000m<sup>2</sup> should contain an environmental annex. This annex should contain the information about energy characteristics of buildings and equipment of leased premises their actual consumption of water and energy and the amount of waste generated. The annex should also reflect the obligation of each party to commit to a program of action to improve the energy and environmental performance of the building as well as of the leased premises. Although the absence of this annex is not sanctioned, it is obligatory to have it (décret n° 2011-2058 du 30 décembre 2011).

From the data gathered from the CBRE research, this environmental annex is of an interest of both a lessor and a leaser. For the real estate owner it brings the awareness of the durability of their properties, the compliance to the environmental regulation and environmental communication. For the leaser it also gives the opportunity to show their environmental compliance, as well as to be aware of reduced energy consumption and carbon footprint.

In Sweden, green leases include not only the points about reduced energy consumption and better waste management but also the green electricity purchase. From the information gathered from the documents of Vasakronan, the biggest real estate company on a Swedish

market, in their green leases they are including not only green materials for construction and renovation and waste sorting but also a purchase of green electricity for their offices. It is said that the use of energy has reduced to 50% with the acceptance of the green lease. According to Fastighetsägarna, a Swedish Property Federation, the sustainability of buildings are of most importance for companies in services sector. Thus, green leases can be a source of information for the benchmark of different buildings and premises. Also, the green leases serve as a demonstration of the seriousness of the company about their sustainability policy. Fastighetsägarna point out that due to these green leases, which show directly the economic benefits of the building in terms of costs reduction in many property management areas, the value of the building rises which can interest the investor.

#### **4.5. Investors' Perceptions about sustainability**

All the interviewees both from Sweden and France have agreed that one of the main reasons that the investors are investing into the sustainable buildings is the current market trend. Since many companies have obligations to make the sustainability reporting, it became important for them to acquire and to rent "green" square meters. Also, the main current interest in acquisition of sustainable buildings is in the better marketability and a shorter commercialization delay.

An employee in a Swedish real estate company has commented the interest of investors in sustainable buildings in a following way:

"Högre hyror och lägre driftskostnader ger högre kassaflöden. Sannolikt blir det en högre avkastning vid en försäljning, eftersom fastigheten ses som mer attraktiv. Fastigheterna attraherar både fler investerare och även hyresgäster som vill profilera sig i miljöbyggnader.

*Higher rents and lower operating costs results in higher cash flows. Most likely there will be a higher return on a sale, as the property is seen as more attractive. These properties attract more investors and also more tenants who wish to distinguish themselves in occupying environmental buildings."*

Some of the investors and occupiers have a particular interest in green buildings with specific certifications, others are investing into such property since they believe that this property can be rented out faster and there will be no loss of money.

However, according to the respondent from the Valuation Department of CBRE, despite the current "green" trend, there are still some investors who admit that the sustainable building is good for the environment but it costs more than the conventional one and thus, if the company is interested in the cost savings, they are not going to invest into the sustainable property.

Moreover, the lack of the sustainability criteria can be replaced by the location of the building. According to one of the respondents:

*“Un très bon emplacement (triangle d’or parisien par exemple) peut compenser l’absence de valeur verte. Moins l’emplacement sera bon, plus ces enjeux seront à traiter.*

*(A very good location (like the Parisian golden triangle- avenue Montaigne, avenue George-V and rue François-Ier) can compensate the absence of the green value. The worse is the location, the more these issues will be addressed.)”*

Another interviewee mentioned that the location is among first criterions for real estate investments. The proximity to the public transport and the easiness of getting to the building can play an important role for the investors. Moreover, there are not many certifications in the provincial regions. The main areas which have the most of sustainable buildings in the Paris CBD, La Defense, north west and south west business areas of Parisian region.

When it comes to the differentiation between different real estate sectors, it has been found out that offices are still the prevailing sustainable investment in France. However, logistics properties are gaining its strength in Sweden. NCC has several logistics projects that are going to be certified with BREEAM. The question was asked to our contact person in NCC about the value of certification of logistics buildings:

*“Vi har gjort ett strategiskt val att miljöcertifiera samtliga kommersiella fastigheter vi utvecklar i egen regi. I dagsläget har vi en något lägre intern lägsta målnivå i logistik och handelsprojekt (BREEAM Very Good) än i kontorsprojekt (BREEAM Excellent). I dagsläget är marknadens efterfrågan av ambitiösa miljöcertifieringar inte lika tydlig i alla delar av logistiksegmentet som i kontors- och handelssegmenten. För NCC är beslutet att BREEAM certifiera samtliga fastigheter en indikator på att vi vill hålla en hög hållbarhetsprofil i samtliga byggnader vi utvecklar. Hållbarhetsfrågan står redan idag mycket högt på agendan i många av de logistikområden vi utvecklar bland annat åt Stockholms och Göteborgs hamn. Transportsektorns miljöpåverkan en fråga som kommer fortsätta stå högt på agendan i framtidens hållbarhetsdiskussioner och aktörer inom logistikbranschen har ögonen på sig. Att lokalisera sin verksamhet till en fastighet med hög hållbarhetsprestanda har ett viktigt symbolvärde och är ett steg på vägen till att ta ansvar för sin miljöpåverkan.*

*(We have made a strategic choice to certify all commercial property we develop ourselves. In the current situation, we have a slightly lower target level of certification in logistics and retail projects (BREEAM Very Good) than in office projects (BREEAM Excellent). Right now the demand of environmental certifications for logistics is not as clear in the office and retail segments. The NCC’s decision to certify with BREEAM all buildings is an indicator that we want to keep a high sustainability profile in all the buildings we develop. The sustainability issue is already very high on the*

*agenda in many of the logistics areas we develop amongst others at the Stockholm and Gothenburg. The transport sector's impact on the environment is an issue that will continue to be high on the agenda in the future sustainability discussions and players in the logistics industry monitor the situation. To move their business to a property with a high sustainability performance has an important symbolic value and is a step on the road to taking responsibility for their environmental impact.)”*

The same thought share the respondents from France. They believe that although today the investment into green buildings is not exceptional but still not yet ubiquitous, in the future “green” buildings will become a norm and the conventional ones will degrade. Thus it is reasonable for companies to invest into sustainability. However, a French interviewee has also added that the will to invest into the future depends on the strategy of the company. Thus, a company that is planning to keep their property for a long time are interested in its durability characteristics and consequently they value the level of sustainability of the building. Another type of companies, which are interested in reselling the building in a couple of years are interested in mainly the marketing strategy that the green building can offer and the interest in the actual sustainable characteristics is almost non-existent. Also, companies as the last ones often purchase opportunistic assets which require renovation and repositioning on the market. They convert them to sustainable buildings and put out on the market for sale.

The CBRE research in France has made a survey of investors about the criteria that they use in order to make an investment decision. First three most important criteria are still the cost criteria, followed by the location and accessibility of the building by different means of transport. The sustainable performance of the building is on the 5<sup>th</sup> place, twice less importance than the location.

#### **4.6. Sustainability implication in valuation processes**

The importance of valuation in real estate investment choices has been outlined previously in the theory chapter. The integration of sustainability criteria into the valuation process has been discussed with the experts of the CBRE valuation department as well as the author has tried to check how to integrate in practice the sustainability criteria in appraisal of real estate.

##### *- Comparable Sales approach*

This approach is often demanded by investors in their valuation reports since they want to compare their property to the offers/transactions that were made on the market. However, all experts in the valuation department agreed that this approach is of a little use when the sustainable building is to be appraised. According to the director of the national team of the valuation department at CBRE France, there are still too few buildings that have same level

of sustainability, same certifications as well as other similar characteristics. According to him, there may be some areas in Paris, like La Defence, where it may be possible to find properties more or less similar to each other, but there are too few to make a solid valuation platform. Thus, this approach is never considered in the valuation of the sustainable real estate.

During the marker research, undertaken by the author, both in Sweden and in France, it was clear that there is not enough information available on the open market about these kinds of buildings. Moreover, buildings have often very different physical characteristics what made it clear that the comparable sales approached is not the most suitable to be used under the current market conditions.

#### - DCF approach

The DCF approach is said to be a better method for real estate valuation since it is less dependent on the qualities of other properties on the market as well as since it takes into account the financial aspects of the property. The sustainability criteria can be included into the formula of the DCF in terms of lower risk premium and consequently a lower discounting rate and together with the higher cash flow ( due to the higher rent and lower costs) increasing the value of the property.

$$V \uparrow = \frac{CF_1 \uparrow}{(1 + r \downarrow)^1} + \frac{CF_2 \uparrow}{(1 + r \downarrow)^2} + \dots + \frac{CF_n \uparrow}{(1 + r \downarrow)^n}$$

However, during the interviews with experts who have done the appraisal of the sustainable buildings, it was mentioned that in theory it should be correct, but due to the lack of evidence that sustainable buildings have less risk, due to their recent appearance on the market, it is impossible to draw the exact conclusions. It is still hard to estimate the level of risk and how much it diminishes when the building has “green” qualities. The same difficulty was found in the process of differentiation of the perceived IRR of the green building and of a conventional. However, even if the risk level is hard to determine, a sustainable building can have an effect of the cash-flow. For example, when a building has a room for improvements, i.e. is does not have all characteristics of a Core asset, it is possible to see that the sustainability features can increase its cash-flow due to the ability of investors to demand higher rents from future occupiers.

Furthermore, although it is hard to translate the “green” value into numbers, according to experts it is possible to quantify the sustainability benefits in terms of better and faster marketability of premises, lower vacancy allowances and fewer capital expenditures. These factors, combined with the higher initial rent can give the higher net income; increase the cash flow from leasing the building and result into a higher value of the property.

- *Direct capitalization*

$$\text{Value} = \frac{\text{NOI}}{\text{Capitalization rate}}$$

When the DCF approach discounts future cash flows, the direct capitalization looks at potential profit that the property can make through the Net Operating Income. Despite many advantages of this approach, one of its drawbacks for the estimation of value of the sustainable buildings is that it does not consider the capital expenditures.

According to appraisers, the effect of sustainability on NOI is quite low; however it can be still visible. Due to lower operating expenses and higher rents, the net income of sustainable real estate owners can be also higher than the one of a conventional building. This can increase the value of the investment.

Although the NOI can show well enough the effect of the sustainability on the value of the investment, it is still difficult to get a cap rate which can fully show the effect of the sustainability. One way of determining the cap rate of the property is to take a look at comparable sales. During interviews, experts admitted that there are already very few “green” buildings with sustainable certifications, there are even fewer of them with comparable characteristics and even fewer sales of such buildings from which the cap rate can be derived. At the moment all market data and research is done without separation between sustainable and conventional buildings and thus the “green” value is not incorporated in the cap rate when appraising the building.

Despite the difficulty in the determination of the cap rate of sustainable buildings, it can be seen that the value of investments in real estate can be affected by sustainability component which can be reflected in the higher NOI value of a building.

- Sustainable certification and value of real estate investments

All the experts agreed that in the current situation of the market the effect of the sustainability certifications is relatively low. Moreover, there is no differentiation between different certifications and their levels. According to one of the respondents, it is already hard to incorporate sustainable value into the valuation, moreover at the moment there is even less information about the performance of buildings with different level of sustainability. Thus, the difference in buildings certification (whether it is bronze or gold or silver) is not taken into account during appraisal. However, it is believed that in the future it will be more possible to incorporate the value of sustainability as well as different levels of certification in the valuation process since there will be more data about the performance of such type of buildings.

The question was raised for experts whether companies who ask them to appraise the real estate investment want to know the effect of the particular type of certification on the value. The answer was that right now companies are more interested in the investment value itself

and not in the effect of the certification on it. Despite quite negative feedback on this topic, it has been also found that although the certifications have a very low influence on the value, they are actually serving as a sort of guarantee for the building to be able to produce higher return on the investment and to be more interesting on the demand market. Thus, it can be concluded that there is still a tacit effect of certifications on the value of the real estate.

## 5. Analysis

This thesis aimed to research three questions that were brought up in the introduction and which will be analyzed one by one with the help of the empirical data that was gathered from interviews and which was based on the selected theoretical concepts.

- 1) *What are the main reasons for companies to invest into sustainable real estate? What are the main sectors of sustainable real estate investment in France and in Sweden?*

Theory has shown that the real estate investments have the same aim as any type of investment- to gain profit, whether it is a direct or indirect investment. This thesis had an intention to consider only direct real estate investments since they require more interest from companies in physical characteristics of the building.

From the empirical part of this thesis it is possible to conclude that the reasons why companies want to invest into sustainability differ. First of all, in France, investors need to show in their sustainability report their compliance with the sustainability regulations and norms (especially if in their possession they have premises of more than 2000m<sup>2</sup>).

In comparison to France, in Sweden, there are no such regulations, however, companies are still interested in showing their commitment to the environment in order to preserve their good reputation and show their company's values.

Another reason that was true for all companies is the growing market interest in sustainable commercial real estate. Many companies are trying to move their activities to "green" locations because of increasing productivity of people, lower costs, etc. Thus, the marketability of the sustainable property is higher and the costs for the tenant search are lower. The sustainability aspect of the building can thus play an important role in the securitization of the future cash flows on the investment.

The business management and environmental policies of investment companies can also be a reason the company wants to invest in "green" buildings. These two investment choice criteria of companies have been noticed in both countries.

It was also found that the core/ core+ assets can attract investors even if they are not sustainable. This can be theoretically explained that these assets already have high rents, low vacancy rate and thus are already financially attractive for the investor. Moreover, it can be difficult to increase the prime rents even more on the market, asking a premium for the sustainability criteria since there is no actual proof to what extent "green" buildings are superior to conventional ones.

Also, in France, different types of investors are interested in different aspects of sustainable building. For investors who plan to keep their property for a longer time, it is mainly the durability of the building that presents the main investment interest. Another type of investors, those who plan to make a short-term investment are more interested in the demand on such real estate.

When looking at the investments in different sustainable commercial properties in France and in Sweden, there is a clear trend in the acquisition of office buildings. This trend can be



explained by a longer history of sustainable construction and certification of office premises. However in Sweden, there are more and more logistics buildings that are being built according to sustainability standards and which are officially certified. It was interesting to see that not only the investment sectors are slightly differing but also the certification systems. In France, despite the high proportion of foreign investors, the main certification system is HQE. However nowadays, more and more properties are developed with HQE+ BREEAM or LEED. This is due to the interest of foreign investors and occupiers in buildings with particular sustainable certifications. Thus, investors are not only interested in a particular sector of real estate but also, in some cases in a particular certifications. Many American companies are placing a demand on a LEED certificated buildings while the UK and other European investors are more interested in BREEAM certified properties.

In Sweden, where the majority of investors come from Sweden or Nordics, BREEAM is one of the main certifications, although the Swedish Miljöbyggnad has been existing for a long time. This can be explained by the growing interest of investors in Swedish real estate due to the stability of the economy of the country even during the recent crisis.

## *2) What is the premium that investors are expecting from sustainable buildings?*

There are no exact data on premiums that investors can get from the acquisition of sustainable real estate. However, different investors have different expectations from such properties. As it has been mentioned in the previous question, from the data that was gathered in France, some investors do have a real interest in the sustainable qualities of a building. They expect the building to produce less cost and to keep its qualitative characteristics longer.

Same trend have many Swedish companies, which are interested in the cost reductions, better working conditions for their tenants as well as in a reduction of the harmful effect of real estate on the environment. The expectation of the durability of the building is often secured with "Green Leases" which present, among others, the obligations of both tenant and owner to have a behavior and follow the norms to preserve longer the sustainability of a building as well as not make it losing its "greenness".

While some investors are interested in long-term cost reductions, other investors are interested only in the profit that they can get from the re-sell of the building. They are more interested in the image of the building and its market demand rather than in its environmental friendly qualities.

The financial premiums interest many investors, however, at the moment, it is hard to put into numbers the value that sustainable buildings can produce. Theoretically, the risk that can be attributed to the sustainable building is lower than the one of conventional but due to the lack of prove it is impossible to talk about the difference in risk between these two types of investment. However, the cash flows can be more secured from the sustainable building than from conventional one, having all factors same. More and more tenants are now looking for sustainability for different reasons both in France and in Sweden thus the premium of a shorter leasing period can be of a particular interest for investors.

### 3) What is the difference in value of sustainable buildings with different certifications?

During the research it was derived that there is not a big difference in the valuation of sustainable real estate and conventional. Moreover, it can be that the buildings that are better located and have all characteristics of a Core asset have a higher value for the investor than sustainable ones but in different locations.

Unfortunately there are no exact means to transform the “soft” qualities of the building into the financial values. However, it has been noticed that if taking two non-core buildings, one with sustainable certifications and features and the other conventional one, the sustainable one will have a higher value. This value can be higher due to the fewer capital expenditures that could be done during the company’s building possession as well due to the amount of money spent to the process of certification and utilization of materials of a higher quality. Moreover, since nowadays more companies want to locate their businesses in sustainable buildings, they would be more interested in paying higher rents, thus increasing the annual cash flow and consequently the value of the building.

When it comes to buildings with different certification levels, it is quite difficult to make a clear distinction in difference of values. Although many certifications have provided the division of buildings by the level of sustainability achieved, it is still hard to apply different values to different certifications. However, more and more companies are interested in both acquisition and rent of sustainable buildings with high certification standards and furthermore, in the nearest future it will be much easier to follow the effect of the certification on value of buildings since the situation will change due to the emergence of more sustainable buildings on the market.

## 6. Conclusions and suggestion for further research

During the research it was found out that there are many reasons why investors are interested in sustainable buildings as well as their expectations from these type of investments vary. Despite the higher price for these type of buildings, the increasing number of companies are starting to be interested in them.

Although the initial value and attractiveness of the building is important for companies while choosing their target investment, the future benefits are also taken into account. Sustainable building is able to provide its owners with more secure and higher cash flow and possibly lower risk. One common trend between investors in both Sweden and France is that they are interested in the attractiveness of their purchase on the demand market, whether it is a rent or sale market since it makes their investment more liquid. In difference to Sweden, in France this trend is also stimulated by the regulations that are applied for investments in buildings with more than 2000m<sup>2</sup>, where the environmental annex becomes obligatory. Moreover, the durability of a building itself is an important factor for investors and it makes sustainable buildings even more attractive in their eyes and the sustainability certifications help them in choosing correctly.

The common trend in both countries is a growing number of international certifications of buildings which can be explained by the increase of international investment in both Sweden and France. However, despite the fact that sustainable buildings have been present for several years on the market and the number of different environmental certifications it is still hard to attribute the economic value to the sustainability features of a building. Nevertheless, both in Sweden and in France more and more investors are interested in the purchase of sustainable real estate and the sectors of application of sustainable building qualities and sustainable certifications are growing (from offices to logistic buildings and whole urban areas) and it can be concluded that in the nearest future even the “soft” features of a building could be translated into economic value.

For the moment, the main quantifiable criteria of choosing the sustainable commercial property to conventional one is the better marketability since more and more companies are looking for sustainable locations to pursue their activities. Also, the fact that these kind of buildings may need less capital expenditures in the future is very attractive for the investors. Another feature of a green building that adds value and interest for investors is higher rental income that these kind of buildings are able to generate.

To sum up, the main interest of sustainable real estate investments is the same for companies in both Sweden and France with peculiar differences:

Table 3: sustainable investment interest in Sweden and France

	Sweden	France
<b>Reasons investing for</b>	Marketability, higher rents, environment concern, more secured cash flow, durability of a building	Marketability, higher rents, Grenelle law and importance of environmental annex, more secured cash flow, durability of a building, higher valued building in the future
<b>Premium expected</b>	Less vacancies, less capital expenditures, higher net income, possibly lower risk connected to investment	

Source: Own model

- Further research suggestions

In order to better understand the effect of sustainability on investment choices a further research is required. More observations and investigation will be needed in order to be able to translate the full effect of sustainability from a concept to a real added value of a building. Also, it would be interesting to discover the reason behind the will of companies to construct buildings with the highest degree of sustainability (buildings that reach gold levels of certification) as well as the interest of companies in premises with different certification levels. Of a particular interest will be a study of investors' perception about different certification levels and their will to invest money into buildings with different certification levels.

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Sweden Green Building Council: [SGBC.se](http://SGBC.se)

The U.S. Green building Council: [USGBC.org](http://USGBC.org)

French legislation portal: [legifrance.gouv.fr](http://legifrance.gouv.fr)

European Commission: [ec.europa.eu](http://ec.europa.eu)

BREEAM Global: [greenbooklive.com](http://greenbooklive.com)

## Appendix 1

### - Interview companies:

CBRE France

Orfeo developpement, France

NCC, Sweden

CBRE Sweden

### - Interview guide:

What are the main companies that are interested in the sustainable real estate acquisition?  
What kind of investors are they- local or foreign?

Does the location matter when choosing the investment of sustainable real estate? Are the investors more interested in the sustainable buildings in the city centres or in the suburbs?  
Are they in big cities or in small cities?

Which kind of assets the investors are interested in? Office, commercial centres, etc.? Are they core, core plus, value added or opportunistic assets?

Do you know if companies that invest into sustainable commercial real estate benefit from tax easements, governmental subsidies? Which ones?

The companies that are interested in the sustainable real estate are interested just in the sustainability level of a building or they are particularly interested in buildings that have certifications?

Which kind of certifications are the most searched for? Are there preferences between investors between real estate certifications? More investors are looking for LEED, BREEAM or any other certification?

Which certifications prefer international investors: local or international?

Why does it worth to have logistics buildings certified?

(for construction companies) Why have you chosen to develop your buildings with a particular certification standards? Do you know the investor in advance?

Does the building with eco standards require less investments into renovations and capital improvements? Or these investments are not often but quite costly?

In what way the sustainability affects the valuation of real estate?

Do companies want to know the effect of different sustainability certifications on the value of their investment?



## Appendix 2 HQE

Cibles (targets)	Translation
<b>Cible 1 - Relation du bâtiment avec son environnement immédiat</b>	<b>relation of the building with its environment</b>
<b>Cible 2 - Choix intégré des produits, systèmes et procédés de construction</b>	<b>choice of integrated products, systems and processes during construction</b>
<b>Cible 3 - Chantier à faible impact environnemental</b>	<b>construction site with a low environmental impact</b>
<b>Cible 4 - Gestion de l'énergie</b>	<b>energy management</b>
<b>Cible 5 - Gestion de l'eau</b>	<b>water management</b>
<b>Cible 6 - Gestion des déchets d'activités</b>	<b>waste management</b>
<b>Cible 7 - Maintenance - Pérennité des performances environnementales</b>	<b>Maintenance</b>
<b>Cible 8 - Confort hygrométrique</b>	<b>humidity comfort</b>
<b>Cible 9 - Confort acoustique</b>	<b>acoustique comfort</b>
<b>Cible 10 - Confort visuel</b>	<b>visual comfort</b>
<b>Cible 11 - Confort olfactif</b>	<b>olfactory comfort</b>
<b>Cible 12 - Qualité sanitaire des espaces</b>	<b>Sanitary quality of areas</b>
<b>Cible 13 - Qualité sanitaire de l'air</b>	<b>Sanitary quality of air</b>
<b>Cible 14 - Qualité sanitaire de l'eau</b>	<b>Sanitary quality of water</b>

## Appendix 3 Miljöbyggnad

Nr	Indikator	Aspekt	Område
1	Energianvändning	Energianvändning	Energi
2	Värmeeffektbehov	Effektbehov	
3	Solvärmelast		
4	Energislag	Energislag	
5	Ljudmiljö	Ljudmiljö	Innemiljö
6	Radon	Luftkvalitet	
7	Ventilationsstandard		
8	Kvävedioxid		
9	Fuktsäkerhet	Fukt	
10	Termiskt klimat vinter	Termiskt klimat	
11	Termiskt klimat sommar		
12	Dagsljus	Dagsljus	
13	Legionella	Legionella	
14	Dokumentation av byggvaror	Dokumentation av byggvaror	Material
15	Utfasning av farliga ämnen	Utfasning av farliga ämnen	
16	Sanering av farliga ämnen	Sanering av farliga ämnen	

## Appendix 4 BREEAM

	Points Available
Management	11
Health and wellbeing	14
Energy	23
Transport	9
Water	9
Materials	13
Waste	6
Land Use and Ecology	10
Pollution	12
Innovation	10
Total	117

Grading		Percentage
PASS		≥ 30%
GOOD		≥ 45%
VERY GOOD		≥ 55%
EXCELLENT		≥ 70%
OUTSTANDING		≥ 80%



# LEED 2009 for New Construction and Major Renovation

Project Checklist

Project Name  
Date

## Sustainable Sites Possible Points: 26

Y	N	?	Points
			Prereq 1 Construction Activity Pollution Prevention
Y			Credit 1 Site Selection 1
			Credit 2 Development Density and Community Connectivity 5
			Credit 3 Brownfield Redevelopment 1
			Credit 4.1 Alternative Transportation—Public Transportation Access 6
			Credit 4.2 Alternative Transportation—Bicycle Storage and Changing Rooms 1
			Credit 4.3 Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles 3
			Credit 4.4 Alternative Transportation—Parking Capacity 2
			Credit 5.1 Site Development—Protect or Restore Habitat 1
			Credit 5.2 Site Development—Maximize Open Space 1
			Credit 6.1 Stormwater Design—Quantity Control 1
			Credit 6.2 Stormwater Design—Quality Control 1
			Credit 7.1 Heat Island Effect—Non-roof 1
			Credit 7.2 Heat Island Effect—Roof 1
			Credit 8 Light Pollution Reduction 1

## Water Efficiency Possible Points: 10

Y			Prereq 1 Water Use Reduction—20% Reduction 2 to 4
			Credit 1 Water Efficient Landscaping 2
			Credit 2 Innovative Wastewater Technologies 2 to 4
			Credit 3 Water Use Reduction 2 to 4

## Energy and Atmosphere Possible Points: 35

			Prereq 1 Fundamental Commissioning of Building Energy Systems
Y			Prereq 2 Minimum Energy Performance
Y			Prereq 3 Fundamental Refrigerant Management
			Credit 1 Optimize Energy Performance 1 to 19
			Credit 2 On-Site Renewable Energy 1 to 7
			Credit 3 Enhanced Commissioning 2
			Credit 4 Enhanced Refrigerant Management 2
			Credit 5 Measurement and Verification 3
			Credit 6 Green Power 2

## Materials and Resources Possible Points: 14

Y			Prereq 1 Storage and Collection of Recyclables
			Credit 1.1 Building Reuse—Maintain Existing Walls, Floors, and Roof 1 to 3
			Credit 1.2 Building Reuse—Maintain 50% of Interior Non-Structural Elements 1
			Credit 2 Construction Waste Management 1 to 2
			Credit 3 Materials Reuse 1 to 2

## Materials and Resources, Continued

Y	N	?	Points
			Credit 4 Recycled Content 1 to 2
			Credit 5 Regional Materials 1 to 2
			Credit 6 Rapidly Renewable Materials 1
			Credit 7 Certified Wood 1

## Indoor Environmental Quality Possible Points: 15

Y			Prereq 1 Minimum Indoor Air Quality Performance
Y			Prereq 2 Environmental Tobacco Smoke (ETS) Control
			Credit 1 Outdoor Air Delivery Monitoring 1
			Credit 2 Increased Ventilation 1
			Credit 3.1 Construction IAQ Management Plan—During Construction 1
			Credit 3.2 Construction IAQ Management Plan—Before Occupancy 1
			Credit 4.1 Low-Emitting Materials—Adhesives and Sealants 1
			Credit 4.2 Low-Emitting Materials—Paints and Coatings 1
			Credit 4.3 Low-Emitting Materials—Flooring Systems 1
			Credit 4.4 Low-Emitting Materials—Composite Wood and Agrifiber Products 1
			Credit 5 Indoor Chemical and Pollutant Source Control 1
			Credit 6.1 Controllability of Systems—Lighting 1
			Credit 6.2 Controllability of Systems—Thermal Comfort 1
			Credit 7.1 Thermal Comfort—Design 1
			Credit 7.2 Thermal Comfort—Verification 1
			Credit 8.1 Daylight and Views—Daylight 1
			Credit 8.2 Daylight and Views—Views 1

## Innovation and Design Process Possible Points: 6

			Credit 1.1 Innovation in Design: Specific Title 1
			Credit 1.2 Innovation in Design: Specific Title 1
			Credit 1.3 Innovation in Design: Specific Title 1
			Credit 1.4 Innovation in Design: Specific Title 1
			Credit 1.5 Innovation in Design: Specific Title 1
			Credit 2 LEED Accredited Professional 1

## Regional Priority Credits Possible Points: 4

			Credit 1.1 Regional Priority: Specific Credit 1
			Credit 1.2 Regional Priority: Specific Credit 1
			Credit 1.3 Regional Priority: Specific Credit 1
			Credit 1.4 Regional Priority: Specific Credit 1

## Total Possible Points: 110

Continued on the next page. Show 30 to 39 points. Credit 1.5 on the bottom. Prerequisite 1 to 110