

Green bonds: greening capital, organizations and potentially a building or two

A case study of the green bond financed construction and real estate sector in Sweden

Balthazar Mandahl Forsberg

Master Thesis Series in Environmental Studies and Sustainability Science,
No 2018:032

A thesis submitted in partial fulfillment of the requirements of Lund University
International Master's Programme in Environmental Studies and Sustainability Science
(30hp/credits)



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Submitted October, 2018

Supervisor: Elina Andersson, LUCSUS, Lund University

Abstract:

With the ongoing climate collapse, there is a need for a capital switch, rerouting investments into low carbon infrastructure. Green bonds are a new financial vehicle aimed to facilitate this transition. Through signaling the issuers' intent to use the proceeds of the bonds towards environmentally beneficial activities, they increase transparency and allow investors to better calculate risks while at the same time having a positive environmental impact. Yet, it is unclear to what extent green bonds bring issuers benefits, incentivizing or enabling them to conduct more green projects or increase the environmental standards in future projects. Furthermore, the lack of standardization of what qualifies as green has raised concerns over the environmental integrity of green bond funded projects. This is explored through a case study of the Swedish green bond-financed construction and real estate sector using semi-structured interviews as well as analyzing the commitments made under issuers' green bond frameworks. The results show that eligibility criteria for green bond financed buildings do generally not ensure low upstream emissions but tend to emphasize downstream emissions through energy efficiency requirements. Furthermore, findings indicate that the direct material impact of green bonds is very limited. Nevertheless, green bonds can bring issuers financial benefits as well as strengthening issuers' long-term sustainability focus.

Keywords: Sustainability Science, green bonds, green buildings, sustainable finance, additionality, ESG investment

Word count: 13995

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1 Introduction

In 2015, 195 countries declared their intent to ratify the Paris Agreement and limit global warming to well below 2 °C in relation to pre-industrial levels (UNFCCC, 2015). Despite the stated political will and the scientific consensus, current declared national determined contributions made under the Paris Agreement is estimated to result in a 2.7-3.7 °C global temperature rise (Dagnet et al. 2016). This would cause detrimental effects to natural systems and livelihoods globally (IPCC, 2014). In order to change this trajectory a rapid transformation of the built environment is necessary (Sayre, 2010). This green transition will require vast infrastructure investments globally in the coming years (OECD, 2017a, p 18).

In this context, green bonds have increasingly been touted as an efficient market solution to channel private capital into low carbon infrastructure (OECD 2017b; UNDP 2016). Green bonds are, just as conventional bonds, a fixed-income debt instrument. The fundamental difference is that issuers of green bonds commit to using the proceeds of the bonds to fund environmentally beneficial activities such as climate mitigation or biodiversity conservation. Initiated in 2008, the labeled green bond market has grown exponentially, reaching USD 155 billion in 2017 with estimates for 2018 predicting an issuance of USD 250-300 billion (Climate Bond Initiative, 2018b). Yet, despite the rapid growth of the market, it is unclear to what extent green bonds facilitate a transition to a low carbon economy.

Green bonds can create financial benefits such as attracting new investors and providing issuers with a slightly lower interest rate (OECD, 2017b; SOU, 2017). Moreover, there is anecdotal evidence of organizational benefits such as heightened focus on sustainability issues and increased cross-departmental connections. However, concerns have been raised over benefits are not tangible enough to create environmental additionality (Shishlov, Morel & Cochran, 2016). Furthermore, the lack of standards may allow for projects with low environmental integrity to be financed through green bonds (De Nederlandsche Bank, 2017; Shishlov, Morel & Cochran, 2016; HLEG, 2018). This question is especially important as states and supranational actors are increasingly looking to intervene in the green bond market to promote its expansion (SOU, 2017) and to standardize procedures and definitions of green bonds (HLEG, 2018).

1.1 Aim and research question

In order to fill this research gap, I conduct a case study of the green bond financed construction and property sector in Sweden where I answer the overarching research question:

- To what extent are green bonds facilitating a transition to a low carbon construction and real estate sector in Sweden?

To answer this question, I divide the study into three main parts. In each part I will present the main issue and relevant literature followed by an analysis of my empirical material and a short discussion on the findings. In the first section, I examine the sources of greenhouse gas (GHG) emissions from the Swedish construction and real estate sector and evaluate to what extent the commitments made under the green bond frameworks address these emissions. In the second section, I evaluate the tangible and intangible benefits reported by issuers that can contribute to the sustainability work of the issuer. For this purpose, I examine the claimed benefits and disadvantages cited in previous literature on green bonds as well as investigate the new advantages and disadvantages that emerge from my data. In the third section, I assess the direct environmental additionality to see if the issuance of green bonds has directly enabled the issuer to either conduct more low carbon projects or reduce emissions of greenhouse gases in existing projects.

In order to investigate these issues, I perform a literature review of previous studies of the green bond market and analyze primary data collected through semi-structured interviews and the issuers' websites. As this study aims to gain insights on an empirical phenomenon operating through a diverse set of mechanisms, I will not use an overarching theoretical framework to guide my analysis. Instead, I will introduce concepts and theories where they help elucidate the functioning of these mechanisms better.

1.2 Applicability and contributions to sustainability science

Sustainability Science is an interdisciplinary field, concerned with sustainability challenges emerging in the interaction of natural and social systems (Clark & Dickson, 2003). Furthermore, in identifying problems, and researching solutions sustainability science is to facilitate for policymaking and guide trajectories to sustainability transformations (Wiek, Farioli, Fukushi & Yarime, 2012). At its core, this study is about how a transition to a low

carbon economy can take place. I do this by defining the natural science problem, that is, what are the major carbon sources of greenhouse gas emissions in the Swedish construction and property sector. I then move on to explore how green bonds enable and incentivize actors to address these greenhouse gas emissions through a variety of mechanisms. In doing so I draw on concepts from finance, economics of labelling and organizational theory. The aim is to us create theoretically informed knowledge that can guide action in the business-policy interface and address the current trajectory towards unsustainable natural systems.

2 Context: The role of green bonds in the transition to a low carbon economy

In this chapter, I shortly draw out the context in which green bonds have emerged and explain the logic by which the green label can channel new capital towards low carbon projects.

2.1 Investment needs for a low carbon transition

In order to tackle climate change and steer the course to a low carbon future massive investments needs to be made into new infrastructure. A study conducted by the New Climate Economy comparing global infrastructure investment needs in water, energy and transport systems between 2015 and 2030 found that at total of approximately 89 trillion USD in investments will be needed for a high carbon scenario, while an additional 4 trillion USD would suffice for a transition to a low carbon climate-resilient infrastructure (OECD, 2017b, p 18). Furthermore, a report by the International Energy Agency estimated that USD 48 trillion is needed in energy investments until 2035 for a business as usual scenario whilst 53 trillion USD is needed for a chance of meeting the 2-degree target (2014). The key take away from these studies are not the numbers as such but the fact that huge investments are needed in infrastructure and that by adding 5-10% of capital, this new infrastructure can be built in a way that both adapts to and mitigates climate change. However, there is currently a large funding gap to meet the investment needs for a low-carbon transition (HLEG, 2018; OECD, 2017b, p. 20). Private finance has increasingly been mentioned as a key contributor in filling this gap (UNEP, 2015; HLEG, 2018). At current rates, private capital contributes with 60% of the investment in low carbon assets while 40% of investments are publicly funded (Mcinerney & Johannsdottir, 2016). This needs to be drastically scaled up according to Castree and Cristophers, who point out that financial markets are literally molding our current and future infrastructure by directing resources based on calculations of risk and

return (2015). A rapid capital switch, rerouting capital into new low carbon infrastructure is urgently needed, as the economic, ecological and social costs for failing to do so are immense (Castree & Cristophers, 2015).

2.2 Barriers to private investment in a low carbon economy

Clark, Sunderland and Reed have identified four main barriers to private capital investment in low carbon infrastructure (2018). First, there is a lack and asymmetrical distribution of data on non-financial risks such as climate and environmental risks, which leads to suboptimal investment decisions. Second, financial markets tend to favor short-term profit seeking over long term investments due to yearly or even quarterly evaluation metrics for financial investors. This results in preferences for liquidity in investments and decreases investors' incentives to invest in green projects with long time frames and high up-front costs such as renewable energy projects and infrastructure development. Third, the undervaluation of natural capital results in overexploitation of forests, pollution and excessive emissions of greenhouse gases. Fourth, current voluntary initiatives to attract private capital towards sustainability objectives tend to be ineffective in raising sufficient amounts of resources due to a lack of transparency, accountability and sanctions for non-met commitments (Clark, Sunderland & Reed, 2018).

There is strong evidence emerging that non-financial factors relating to a company's strategy concerning environment, society and governance (ESG) aspects are important for the return of a company¹. This is reflected in a significant shift in investors' investment criteria where ESG factors are increasingly being taken into account as can be seen from a report from EY, surveying 320 institutional investors with a third managing more than 10 billion USD (EY, 2017). The share of respondents stating that ESG disclosures do not have real financial impact dropped from 60% to 16% from 2013 to 2016. However, investors perceive that they lack the necessary information to take well-grounded ESG informed decisions (EY, 2017). More transparency on ESG factors could thus spur investment into the low carbon economy

¹ The largest study on the subject to date, covering 2200 studies, found that the positive relationship between the inclusion of ESG factors in the company strategy and return was very well founded (Friede, Busch & Bassen, 2015). This finding was mirrored in another meta-study examining over 100 academic papers on the performance of ESG factors, which revealed that over 89% of the reviewed studies found that companies with high ESG ratings outperformed the market (DB Climate Change Advisors, 2012).

In this context, the green bond label has emerged as a response to the first barrier, of incomplete and asymmetrical information. The green label of the bond is a signal that displays the issuer's intent to use the proceeds to finance initiatives with high environmental integrity. This signal reduces transaction costs for sustainability minded investors, as they have to spend less time and resources searching for green investment opportunities (Johannesson & Stejmar, 2015).

Furthermore, if the green label could attract more investments into bonds this address the second barrier of short-termism. The bond market has been noted as specifically suitable for low carbon infrastructure investments since they are generally very long-term investments requiring high upfront costs and have long dated returns (OECD, 2017b, p.21). According to the OECD, institutional investors in the OECD, such as pension funds and insurance companies managed 93 USD trillions of assets by 2014 (OECD, 2017b, 27). Out of this capital, more than half is invested in bonds with OECD insurance companies placing on average 53% and pension funds 64% of their portfolio in this asset class (OECD, 2017b, 27). As these investors, representing so-called patient capital, are increasingly adopting ESG criteria in their investment strategies (BlackRock, 2018), the green label could help channel additional finance to the bond market.

2.3 The Green bond market

A green bond is, as a normal bond, a fixed income debt instrument. The main difference is that the capital raised through the bonds, referred to as the proceeds, goes towards projects with a positive environmental impact (Talbot, 2017). The first bond labeled "green" was issued by the World Bank in collaboration with the Swedish bank SEB in 2008. By drawing up a framework specifying how eligible projects were chosen along with the criteria for use of proceeds and having it reviewed by an external actor, this bond set a precedent for future issuers and set out the frame for market practice (SOU, 2017). The market remained small for several years, with most issuance made by multilateral development banks (Talbot, 2017). The takeoff came in 2013, as the market started growing rapidly and several important new milestones were reached with the Swedish real estate company Vasakronan issuing the first corporate green bond, the City of Gothenburg became the first city to issue green bonds and multiple US states and Canadian provinces entered the green bond market (SOU, 2017). In 2015 China entered the market with several sub-sovereign entities issuing green bonds and has since then grown its share of the green bond market drastically, with

40% of all green bonds issued during 2017 coming out of the Chinese market (Talbot, 2017). The following year, Poland became the first state to issue sovereign green bonds and has since then been followed by France, Fiji, Nigeria and Indonesia (CBI, 2017d). The green bond annual issuance has been growing exponentially, from 10 billion USD in 2013 to 155 billion in 2017 and is projected reach 250-300 billion USD in 2018 (Climate Bond Initiative, 2018b). To put this in context, the global bond market currently stands at approximately 100 trillion USD (Kidney & Sonerud, 2015). The largest investment category for green bonds to date is energy (43%) followed by green buildings (23%) and transport (13%) (CBI, 2018b). Investors on the green bond market are primarily institutional investors such as pension funds, insurance companies and endowments funds (CBI, 2017a).

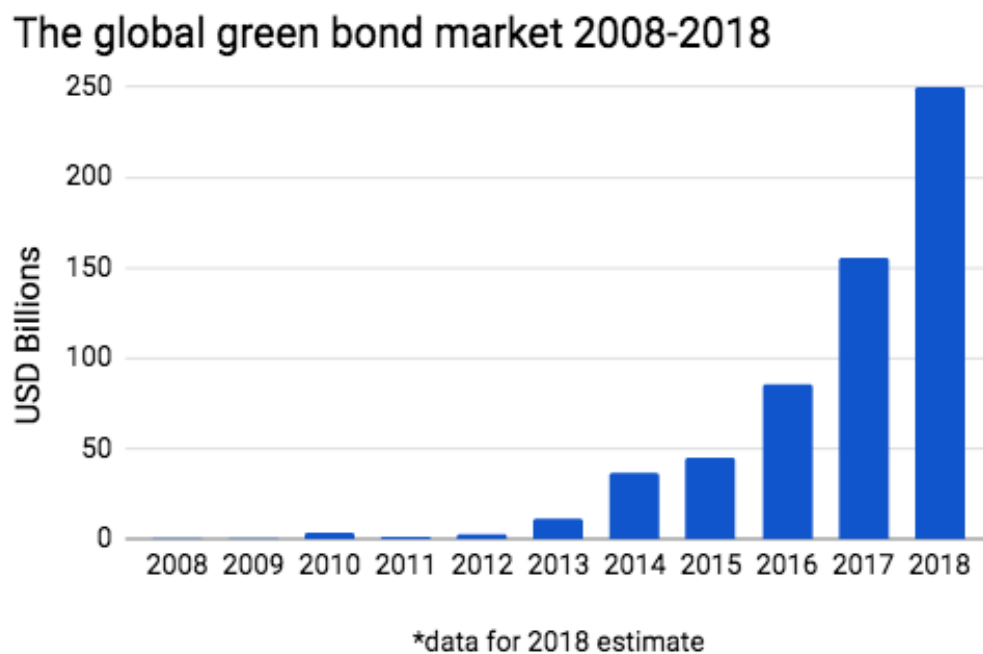


Figure 1: The global green bond market 2008-2018 - issuance per year in USD billions. (Own illustration, 2018; Data: Climate Bond Initiative, 2018b; Seymar & Johansson, 2015)

The global green bond market by sector

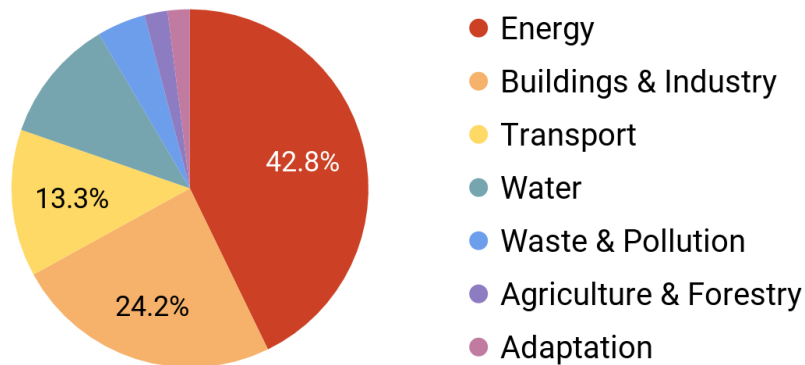


Figure 2: The global green bond market by sector. (Own illustration, 2018; data: Climate Bond Initiative, 2017a)

2.4 What goes for green in the green bond market?

There is no universal definition of what constitutes “green” in the green bond market. In place voluntary standards, guidelines and certifications have been developed by market actors along with recent and fragmented national legislation on standardization of the green bond label (Talbot, 2017). Although not compulsory, it has become standard market practice to follow the Green Bond Principles (GBP) (CBI, 2017a). The GBPs were developed by 13 banks in 2014 and were subsequently published by the International Capital Market Association (ICMA) (SOU, 2017, 165). The green bond principles have four main components. The first principle, the use of proceeds, states that the resources raised through green bonds should go towards environmentally beneficial projects. For this purpose, the GBP provides a taxonomy with an indicative but non-exhaustive list of project categories that could be financed through green bonds. These are broad categories such as renewable energy, climate adaptation and energy efficient buildings. Second, the process by which issuers select green projects should be clearly stated with criteria defining eligible projects. Third, the funds should be tracked and managed separately in order to ensure transparency. Fourth, the issuer should continuously monitor the impact of its projects and report to investors. In addition, it is recommended that the green bond framework, which spells out the above principles, is externally reviewed (ICMA, 2017). As such, the GBP are defining the process and form of the green bonds rather than their content. With a non-exhaustive taxonomy of what types of projects, bonds can go to and their hands-off

approach to any form of definite standard in level of greenness they leave the actual content of the green projects wide open.

Next to the widely adopted GBPs, national regulation is starting to emerge with China and India issuing national guidelines to steer the rapidly growing green bond market. These guidelines do largely mirror the GBPs in their make-up (OECD, 2017c), although the Chinese guidelines adopts a broader taxonomy where “clean coal” investments and retrofitting of fossil fuel power stations are included (CBI, 2016). In addition, issuers can have their green bond frameworks assessed and certified according to an external green bond standard. The Climate Bond Standard developed by the Climate Bond Initiative is the dominant certification scheme. It has a clear taxonomy with standards for each sector (CBI, 2017a). The EU Green Bond Standard is currently in the pipeline. It is proposed to include a taxonomy for eligible project categories and set requirement for reporting and external reviews and is aimed to strengthen investors’ confidence in the green bond market through increased clarity over contents and procedures (HLEG, 2018 p. 72).

2.5 Promotion of the green bond market

The EU, the UNDP and OECD have all stressed that green bonds will be part of the solution to raise more private capital towards a low carbon future. In its newly released report, the European Commission High Level Expert Group on Sustainable Finance (HLEG) stated that the objective of the green bond market was to achieve a "substantial increase in investment in green projects and activities" (HLEG, 2018, p. 27). The United Nations Development Programme (UNDP) has in a similar vein touted green bonds and holds that they “can raise large amounts of financial resources to support environmental projects for which funding might otherwise not be available, or which might be uneconomic if they had to rely on more expensive capital” (UNDP, 2016). Following suite in putting high hopes in the potential of green bonds to contribute to a low carbon economy, the Swedish minister of financial markets, Per Bolund stated, “green bonds can be important for to increase financing for the climate transition” (Swedish government, 2018).

Efforts to promote the green bond market are being considered by governments and supranational institutions. In a recent report, suggestions to allow for lower capital requirements for green investments in the EU has were put forward (HLEG, 2018). Another

measure is Singapore's policy of paying for external reviews of issuer's green bond frameworks, which is currently being considered in Sweden as well (SOU, 2017 p. 297).

2.6 Clouds of concern on the horizon: unclear definitions and limited benefits

The potential of green bonds to facilitate a low carbon transition has nevertheless been questioned. First, several reports have raised concern over the unclear definition of green (De Nederlandsche Bank, 2017; Shishlov, Morel & Cochran, 2016; HLEG, 2018). This may allow for projects that have ambivalent or poor environmental performance to be funded through green bonds (De Nederlandsche Bank, 2017; Shishlov, Morel & Cochran, 2016). Second, it is unclear to what extent the green bonds bring issuers benefits that incentivize or enable them to conduct more or greener projects. A report issued by the Institute for Climate Economics concluded that almost all of the current issuers are established actors on the bond market and do already have access to capital at similar rates (Shishlov, Morel & Cochran, 2016). As such, the green bonds are not enabling new actors to raise capital or provide cheaper capital to current actors (Shishlov, Morel & Cochran, 2016). Further, the authors assert that for the green bond market to support a green transition it must bring the issuers "tangible financial benefits", which it is currently failing to do (Shishlov, Morel & Cochran, 2016).

If green bonds are to facilitate a transition to a low carbon economy, it is necessary that they create environmental additionality in the long run. This means that they enable projects to be built that would not have been built without the green bonds or that they incentivize or enable issuers to increase environmental standards. Meanwhile, the actual impact of green bonds is unclear. A report commissioned by the European Commission raised concern over insufficient data on how green bonds lead to scaling up of green investments (HLEG, 2018). Furthermore, in the extensive report *"To Promote Green Bonds"*, Andersson states that the environmental additionality, is "assumed to exist but hard to prove" (SOU, 2017, p. 261). Since both the environmental integrity of green bond funded projects and the added value of labeling a bond green have been questioned, I will focus on these two aspects in my case study.

3 Theoretical and conceptual frame: signaling theory and the distinction between environmental impact and risk

Although this study this study is primarily inductive in its approach, aiming to map out the empirical material in order to assess the potential of green bonds to scale up investments in low carbon infrastructure, I will already here introduce key concepts that will be used to make sense of the gathered material. Additional concepts will be drawn upon as they help interpret findings emerging from the material.

The green label can be conceptualized as signal sent from the issuer to investors. Signaling theory describes the interaction between actors in a market where the qualities of products are unknown to buyers. The lack of information inhibits sellers of higher quality products to charge a higher price and simultaneously keeps buyers desiring the higher quality product from buying it. In order to be able to realize the higher price, the high quality product seller sends a signal displaying this information. In a repeated series of exchanges where the information can be verified, the signaling results in gains for both buyer and sellers. The seller is able to realize the higher price while the buyer derives value from the higher quality product (Spence, 1973).

The green label can be seen as signaling two conceptually distinct qualities to investors: environmental impact and risk. In capital markets, the 'quality' of the product is decided by the risk and return of the investment (Bodie, Kane & Marcus, 2014). Product attributes, such as a low carbon footprint, can therefore only be considered as far as they have a neutral or positive impact on the risk-adjusted return rates. Although the environmental impact quality by itself may be attractive to some investors, wishing to contribute to a more sustainable world it does not hold potential to significantly alter capital flows. Nevertheless, according to this logic the green label may bring benefits to the issuer to the extent that investors see the communicated qualities, be it energy efficiency or protecting biodiversity, as lowering the financial risk of the investment.

4 A case study of the Swedish green bond market for construction and real estate

In ordered to explore the issue how green bonds can contribute to the transition to a low carbon economy, I conduct a case study of the Swedish green bond market for the

construction and real estate sector. By the term “construction and real estate sector”, I refer to the construction, reconstruction and maintenance of public, commercial and residential buildings in. As such, the construction of infrastructure such as roads and railways are not included. This category is chosen due to three reasons. First, the sector is a major source of emissions and is in dire need of investment. According to the IPCC, the construction and use of buildings used 32% of global energy and accounted for 19% of total GHG emissions (IPCC, 2014, p. 674). Lack of funding is a major impediment to increased production of more energy efficient buildings IPCC (2014, 675). Second, it is currently the second largest project category for green bonds globally. Third, the issue of how to define what is green is exceptionally prominent in this project category. How do we determine what counts as a “green” building? Is it the building’s relative energy efficiency? Is it the emissions from its entire lifecycle? Alternatively, should a larger perspective be taken where the building’s impact on tenants’ and users’ GHG emissions are considered?

The Swedish construction and real estate sector is especially suitable for a case study for a range of reasons. First, the relative maturity of the Swedish green bond financed construction and property sector compared to global counterparts makes it a suitable case study as some of the effects of green bonds may only emerge in the medium or long term. The first corporate bond was issued by Swedish property developer Vasakronan and the City of Gothenburg was first city to issue green bonds (CBI, 2018a). Second, Swedish low carbon building sector is especially developed, being the 3rd largest globally with 44% of the proceeds from Swedish green bonds going to this sector in 2017 (CBI, 2018a) compared to 29% globally (CBI, 2018b). Third, Swedish green property companies are developing best practices by adopting high standards in their green bond framework (CBI, 2018a). This makes it a critical case to test the environmental integrity of the green bond financed projects. Lastly, I am a native speaker of Swedish, which facilitates the process of assessing documents and conducting interviews.

5 Methodology

5.1 Research Design

The main aim of this study is to explore the question: What is the potential of green bonds to facilitate a transition to a low carbon construction and real estate sector in Sweden? In

order to do this I divide the study into two main parts, each with their own sub-questions (table 1). The function of the first part is to assess the greenhouse gas emissions from the Swedish construction and real estate sector and to see to what extent the eligibility criteria set out in the green bond frameworks limits these emissions. In addition, the impact reporting relating to the green bond financed buildings is examined to see how GHG emissions are being monitored and communicated to investors. In the second part, I focus on the impact of green bonds. First, I investigate the tangible and intangible benefits reported by issuers that can contribute to the sustainability work of the issuer. Next, I explore the issue of environmental additionality to see if the issuance of green bonds has directly enabled the issuer to either conduct more low carbon projects or reduce emissions of greenhouse gases in existing projects. I conduct semi-structured interviews with 16 actors on the Swedish green bond market, including the approximately half of all green bond issuers using the proceeds of the bonds to fund green buildings. In addition, I analyze primary documents such as green bond frameworks, second opinion reviews and investors' letters from all green bond financed actors in the Swedish construction and property sector.

Table 1. Research design (Own illustration, 2018)

Main research question: What is the potential for green bonds to facilitate a transition to a low carbon construction and real estate sector in Sweden?		
Part I: Greenhouse gas emissions of green bond financed buildings in Sweden		
Question	Method	Data
What are the main sources of GHGs in the construction and real estate sector in Sweden?	Literature review	Academic and grey literature on GHGs of buildings in Sweden over the whole lifecycle.
What are the criteria for buildings to be financed by green bonds in Sweden?	Quantitative analysis of the eligibility criteria for green bond financed buildings. Analysis of certification requirements of LEED, BREEAM and Miljöbyggnad.	Green bond frameworks of all issuers in the sector and documentation specifying certification requirement for LEED, BREEAM and Miljöbyggnad.
What indicators are used to measure the greenhouse gas emissions of green bond financed buildings in Sweden?	Quantitative analysis of the impact reports and green bond frameworks.	Impact reports and green bond frameworks
Part II: Costs and benefits of green bonds		

What are the costs and benefits for issuers when in issuing green bonds?	Literature review and semi structured interviews	Reports and articles about green bonds and benefits reported by issuers
Part III: The impact of green bonds: Effects on sustainability work and environmental additionality		
To what extent has the issuance of green bonds incentivised or enabled issuers to conduct more low carbon projects or lower emissions in building projects in the future?	Semi structured interviews	The issuers' reported evaluation of environmental additionality

5.2 Sampling

In order to identify the relevant actors I consulted the Climate Bond Initiative (CBI) database listing labeled green bonds. I then contacted the green bond issuers in construction, property development and housing that use all of the proceeds towards low carbon buildings. In addition, I contacted all issuing municipalities and cities having low carbon buildings as part of their use of proceeds. From the first category, 9 out of 13 issuers (75%) agreed to be interviewed while 4 out of 10 issuers (40%) agreed to be interviewed from the second category. Although the size of the sample is small in absolute numbers, the relative size of the sample to the whole population should allow for tentative generalizations. Through contacting all units in the population selection bias is avoided (Vanderstoep & Johnson, 2009).

Table 2. Interviewees (Own illustration, 2018)

Actor	Code	Type	Interviewee position	Interviewee	Medium
City of Malmö	MS1	Issuer - Municipality	Project Manager Environmental Department	Andreas Anderholm Pedersen	Face to face
Gothenburg City	GS	Issuer-Municipality	Head of Finance	Magnus Borelius	Telephone
Förvaltaren	FO	Issuer - Public housing	Head of Finance	Simon Fransson	Telephone
Stångastaden	ST	Issuer - Public housing	Head of Finance	Sofie Moosberg	Telephone

Rikshem	RH	Issuer - Housing	Head of Finance	Jacob Bruzelius	Telephone
Skanska	SA	Issuer - Construction and property development	Head of Treasury	Pär Lageryd	Telephone
Svensk FastighetsFinansiering	SF	Issuer - Finance for property companies	Head of Finance	Claes Helgstrand	Telephone
Atrium Ljungberg	AT	Issuer - Property company	Financial Controller	Albert Olofsson	Face to face
Fabege	FA	Issuer - Property company	Head of Finance	Åsa Lind	Face to face
Vasakronan	VA1, VA2	Issuer - Property company	Head of Sustainability and Head of Finance	Anna Denell and Thomas Nystedt	Face to face
Lund Municipality	LK1	Issuer - Municipality	Financial Controller	Annette Henriksson	Face to face
Lund Municipality	LK2	Issuer - Municipality	Environmental Strategist	Matz Hagberg	Email
City of Malmö	MS2	Issuer - Municipality	Senior Portfolio Manager	Claes Ramel	Face to face
Norrköping Municipality	NK1, NK2	Issuer - Municipality	Environmental Controller and Financial Controller	Johanna Moberg and Tommy Jaensson	Telephone
SKB	SK	Issuer - Housing Cooperative	Head of economy and finance	Joakim Wernersson	Telephone
Öhman	ÖH	Investor - Managing Green Bond Fund	Fund manager	Erika Wranegård	Telephone
Sustainalytics	ST	Second opinion provider	Head of Sustainable Bonds	Trisha Taneja	Telephone

5.3 Semi-structured interviews

Semi-structured interviews is a suitable method for the research objective as the data collected can be compared and quantified while it at the same time allows for qualitative analysis untangling causal relationships and providing nuances to the data. Furthermore, my aim goes beyond merely studying the previously cited benefits of bonds, consequently I will need a research method with which I can ask follow-up questions and directly explore new themes or benefits stated by the green bond issuers. Moreover, according to Lune and Berg, respondents are more likely to state new themes in open-ended questions in interviews compared to surveys (2017, 69).

In designing and conducting the interview, I followed a set of principles prescribed by Lune and Berg (2017). Easy questions were put in the start of the interview since smooth start will make the interviewee feel comfortable and to start feeling committed to the interview (Lune & Berg, 2017, p. 72). The questions were sequenced according to themes in order to create a logical and easy to follow structure. Furthermore, transition phrases were used to clarify when moving from a topic to another. Moreover, leading questions were avoided to avoid influencing the answer of the respondent. By the end of each interview, I checked that important themes had been covered and asked clarifying questions. I added probing questions when I want to follow up on a certain topic. While doing so I tried to make sure to keep the probes and follow up questions neutral in order to not create biased answers. Lastly, as recommended by Lune and Berg (2017, p. 77), I conducted a pilot interview with a knowledgeable respondent to control for length and adequacy types of questions.

5.4 Data on eligibility criteria and reporting

In order to answer the first sub-question regarding the environmental requirements and monitoring of green bond financed building projects in Sweden, I reviewed the green bond frameworks, second opinion reviews, investor letters and impact reports from all actors that had issued green bonds by April 2018. In determining the eligibility criteria the “use of proceed” sections of the green bond frameworks were reviewed and the criteria were aggregated in an excel file in order to quantify the diverse set of eligible projects. In assessing impact reporting, the reported indicators were primarily taken from reviewed investor letters and impact reports. The information provided on impact reporting in the green bond frameworks and second opinion reviews were used in cases when the issuer had not yet issued their first report.

5.5 Data analysis

I transcribed all my interviews in order to be able to conduct a content analysis of the material. The lion part of the data was transcribed word by word while parts with data irrelevant to the research objective were summarized in bullet points. When translating quotes to use directly in my text, I used a method of meaning condensation where the aim is to stay true to the interpreted meaning rather than the exact wording (Benjamin, 1997).

In short, content analysis entails a systematic study and interpretation of a set of data to discover recurring patterns and themes (Lune & Berg, 2017, 182). I am thus using a method of directed content analysis where I create analytical codes based on theories and explanations prevalent in the literature while also staying open to emergent themes in the text. As such, the process is not exclusively inductive or exclusively deductive but a mix between the two. As previous in-depth research is lacking it is nevertheless important to stay open to new themes. The data was then systematically sorted according to the developed themes. After having sorted the data into themes, I conducted axial coding where these themes were broken down further into different sentiments and degrees of attitude. I then looked for patterns in my sorted data, quantify answers the answers as far as possible and singled out quotes that were illustrative of the certain findings. In the final step, I analyzed the patterns in light of existing theories and compared it to previous research.

5.6 Ethical considerations

I have, following Bryman, taken measures to avoid harm to participants, lack of informed consent, invasion of privacy and forms of deception in respect to the participants in the study (2012). Since the interviews focus on the technical and professional knowledge of the interviewees, I judge the risks of harm to participants and invasion of privacy as minor. In the start of every interview, I clearly stated the aim of the study and declared how the material would be used in my research. Furthermore, each interviewee was sent a draft of the study before publication in order to make sure that they approved of the way their interviews were presented and had a chance to correct any misinterpretations.

6 Greenhouse gas emissions of green bond financed buildings in Sweden

The purpose of this section is to investigate how the eligibility criteria set out in the issuers' green bond frameworks address carbon emissions from the building and property sector in Sweden. First, the primary sources of carbon emissions from the Swedish building and property sector are reviewed. Second, I assess all the eligibility criteria set out in the green bond frameworks by green bond issuers in the Swedish construction and real estate sector. Third, the key performance indicators used to track the environmental impact of the green bond funded assets are reviewed. In the fourth and final part, I discuss the possibilities of increasing transparency in regard to expected and actual greenhouse gas emissions from the green bond funded projects.

6.1 Greenhouse gas emissions from the Swedish construction and real estate sector

The Swedish construction and real estate sector generated a total of 20.2 million tons of CO₂ equivalent emissions in the 2015 (Boverket, 2018b). Out of this number, 11.1 million tons of CO₂ equivalent emissions were emitted domestically, which accounts for 18% of total domestic GHG emissions in Sweden. In addition, the sector generated 9.3 million tons of CO₂ equivalent emissions abroad through imported material (Boverket, 2018b). These emissions can be divided up between the upstream emissions taking place during production of materials and the construction of the building, and downstream emissions, which are generated through the operations and heating of the building. Next to GHG emissions directly connected to material embodied in the building and the energy required for its operations, a building's location, design, and fit into the wider built environment produces certain uses that may be more or less CO₂ intensive (Alhorr, Eliskandarani & Elsarrag, 2014). The built environment constrains, directs, enables and nudges in a myriad of ways, creating various outcomes in, among other things, the intensity of people per housing area, amount of transport needed and mode of transport used (Alhorr, Eliskandarani & Elsarrag, 2014).

In 2014, 40% of total GHGs from the Swedish construction and real estate sector were emitted during the production and construction phase, while 30% were emitted from heating and the final 30% come from renovations and reconstructions (Boverket, 2018b).

The share of the sector's greenhouse gas emissions from heating has drastically decreased over the past 25 years. In 1993, heating accounted for 70% of emissions compared to 40% in 2014 (Boverket, 2018b). This drop in emissions has primarily been driven by a switch from fossil fuel-based heating to electricity and district heating (Boverket, 2015). These energy sources are low in fossil fuel use with 2% out of the Swedish electricity production being fossil based, while fossil fuels generated 20% of district heating in 2015 (Energimyndigheten, 2017). This change in energy sources has been accompanied by increased energy efficiency. Temperature-adjusted energy use per square meter has dropped by 14% on average for all buildings in Sweden between 1995 and 2014 (Naturvårdsverket, 2017, p. 246). In contrast, total emissions from construction and reconstruction have remained stable over the same period (Boverket, 2018b). The major upstream GHG emission sources are cement production, accounting for roughly 30%, and energy use accounting for another 30% of GHG emissions (Boverket, 2014). This relative shift of GHG emissions increasingly coming from a buildings embodied material rather than its operational phase has been observed beyond Sweden (Pomponi et al., 2016a, Crawford, 2011; Ibn-Mohammed et al., 2013). Consequently, it is clear that any serious effort to curb the sector's greenhouse gas emissions must address production and construction, energy efficiency and energy source, and renovations and reconstruction alike.

6.2 Eligibility criteria in the green bond frameworks

The eligibility criteria set out in an issuer's green bond framework (GBF) determine the minimum requirements for a project to be funded with the money raised the green bonds. In this section, I analyze the eligibility criteria set out in the GBFs of all 25 green bond issuers in the sector.

The two main requirements used to determine whether new or existing buildings can be funded through the green bonds are green building certifications and energy efficiency standards defined as maximum energy use per square meter per year. These two types of requirements are used in varying ways in the green bonds frameworks. Certification and energy efficiency standards were used as tandem requirements in 36% of the reviewed GBFs. Certification was the only requirement in 24% of the GBF's while the 16% of the GBF's had energy efficiency as the sole requirement. The remaining 24% had a flexible approach with either certification or energy efficiency standards as requirement. In addition, some of the frameworks with maximum energy use per square meter as sole requirement stated

that certification was preferred. To view the numbers from different light, 40% of the frameworks permit issuers to finance new buildings based solely on energy efficiency requirements while 48% allows for financing buildings without energy efficiency requirements beyond legal standards.

Eligibility criteria - new and existing buildings

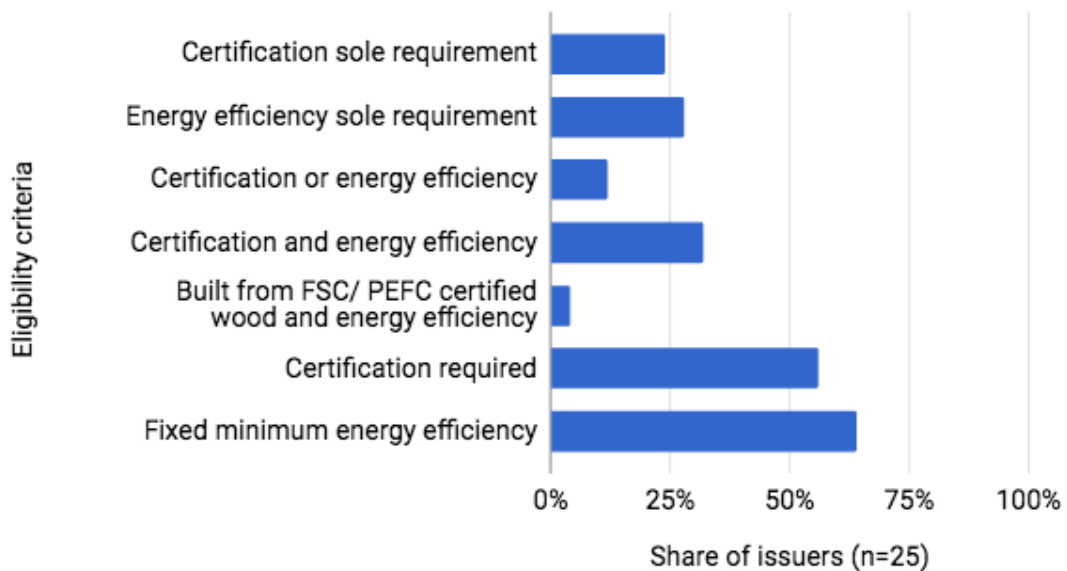


Figure 3. Eligibility criteria for new and existing buildings in issuers' green bonds frameworks from Swedish construction and real estate industry. (Own illustration, 2018)

Eligibility criteria - level of certification and energy efficiency

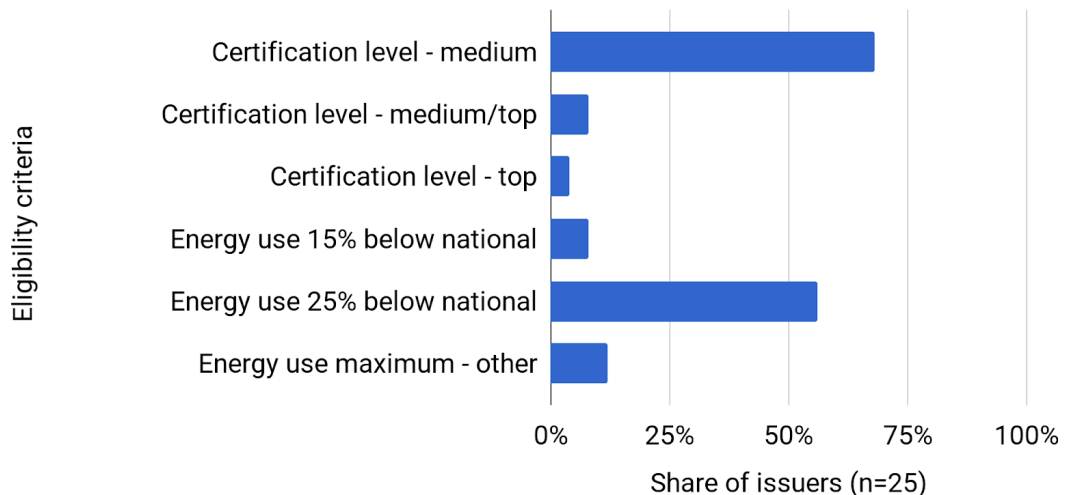


Figure 4. Eligibility criteria for new and existing buildings in issuers' green bonds frameworks from Swedish construction and real estate industry. Certification level high refers to BREEAM-SE very good/excellent, LEED gold, Miljöbyggnad silver, Sunda hus certified and Svanen certified. Certification level top refers to BREEAM-SE outstanding, LEED platinum and Miljöbyggnad guld. The category "Certification level - medium/top" refers to issuers that have a medium level requirement for one certification scheme and top-level requirement for another. (Own illustration, 2018)

Next to financing buildings in accordance with the above eligibility criteria, 72% of the GBFs allow for financing of major renovations. The energy efficiency gains required under these renovations range from 20% to 50% with 25% being the most frequent value. In addition, one issuer required both certification and energy use under 100kWh per square meter and year. The single and combined use of eligibility criteria discussed in this section has important implications for the potential greenhouse gas emissions from the green bond funded projects.

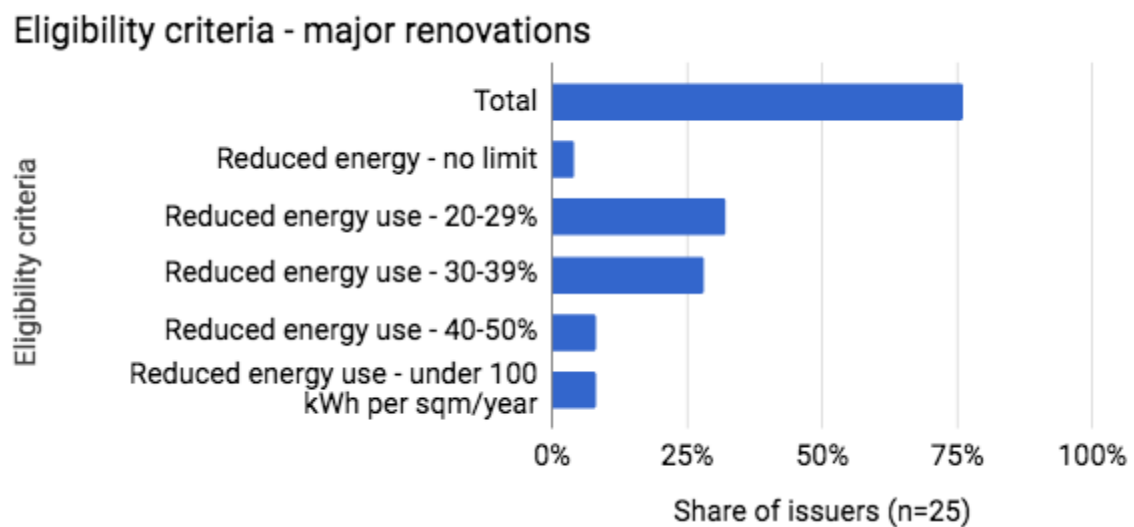


Figure 5: Eligibility criteria for major renovations in issuers' green bonds frameworks from Swedish construction and real estate industry. Note that all renovations that result in the building meeting the eligibility criteria for new and existing buildings qualifies for green bond funding as well. (Own illustration, 2018)

6.3 Energy efficiency criteria

In order to make sense of what these eligibility criteria mean for the greenhouse gas emissions of the green bond financed projects, I will start with discussing the maximum energy use per square meter requirement. This requirement is set in relation to the maximum energy use per square meter permitted under the Swedish building regulations (Boverkets byggregler, BBR). The minimum requirements, which are set by National Board of Housing, Building and Planning, permits a use of 85 kWh/m² for multi-residential housing and 80 kWh/m² for commercial buildings (Boverket, 2016). Most issuers have set their energy efficiency requirement in relation to BBR with 60% opting for at least 25% below and 8% for 15% below while 8% used other referent points to set their minimum energy efficiency standards. As Sweden is seen as a frontrunner national building codes and regulations, with high demands on energy efficiency (Annunziata & Rizzi, 2013), these commitments are set to ensure high-energy efficiency standards. Nevertheless, relying

solely on energy efficiency criteria to determine the carbon impact of a building is problematic as this fails to capture the greenhouse gas emissions generated during production, construction and renovations. Energy efficiency gains can to a degree be offset by the emissions used in the production of extra material used in thermal insulation (Crawford, Bartak, Stephan, & Jensen, 2016). Depending on the materials used and the construction process the final greenhouse gas emissions from the green bond funded projects relying solely on energy efficiency can therefore vary widely. Consequently, a more holistic approach is needed, which leads us to the next section on certifications.

6.4 Certification schemes

In this section I will unpack certification schemes referred to in the GBF's to see to what extent their application limits the potential greenhouse gas emissions from green bond funded projects. From the reviewed GBFs, 60% have certification of the buildings required out of which 4% (one issuer) requires its projects to have the top certification (LEED platinum or BREEAM outstanding) while the rest settles for the levels below (Miljöbyggnad silver, LEED gold or BREEAM very good or BREEAM excellent, Svanen or Sunda hus). As the most frequently used certification schemes are Miljöbyggnad (68%), BREEAM (60%) and LEED (48%), I will use them as the basis for the following discussion. These certification schemes constitute a more holistic approach to greenhouse gas emissions than relying entirely on energy efficiency standards as they include factors such as material use, energy sources and site location (see table 3). Nevertheless, all three certification schemes fail to consider the energy used and waste generated during the construction phase (BREEAM 2017; Swedish Green Building Council, 2017a; Swedish Green Building Council, 2017b).

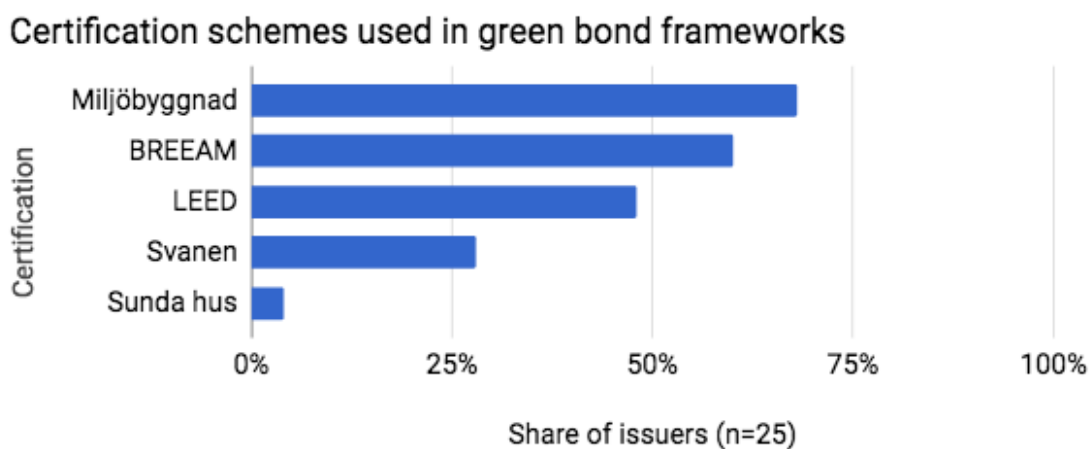


Figure 6. Certification schemes used in the eligibility criteria for new and existing buildings in issuers' green bonds frameworks from Swedish construction and real estate industry (Own illustration: 2018)

Furthermore, while certification captures more dimensions, the system of weighting employed in all three schemes allows other factors to balance out poor performance in energy or materials. Energy connected factors made up between 16% and 34% while materials and resources account for between 13% and 33%. At the same time, non-environmental factors make up a large portion of the criteria with “indoor environment” and “health and well-being” including parameters such as acoustics and proportion of daylight ranging from 13% to 33.3%. In regard to energy efficiency minimum levels, all three certifications reviewed put the maximum level of energy consumption allowed equal to national legal requirements (BREEAM 2017; Swedish Green Building Council, 2017a; Swedish Green Building Council, 2017b). The only exceptions are BREEAM certification levels from “excellent” and “outstanding” (BREEAM, 2017, p.22). As such, the environmental integrity may be compromised to some extent. The combination of both minimum energy efficiency requirements and certification employed by 36% of the issuers seems as the most rigorous currently used approach to ensure the environmental integrity of green bond financed projects.

Table 3 The three most frequently used certification schemes in the eligibility criteria for new and existing buildings in issuers’ green bonds frameworks from Swedish construction and real estate industry. (Own illustration, 2018; data: BREEAM – SE, 2017; Miljöbyggnad, 2017a; LEED, 2016).

BREEAM-SE - New Construction 2017		LEED - New Construction v.4 2018		Miljöbyggnad - 3.0 2017	
Category	Weighting total (110%)	Category	Weighting total (110%)	Category	Weighting (total 100%)
Energy	17%-19%	Energy and atmosphere	34%	Energy	33,3%
Materials	17%-22%	Materials and resources	13%	Materials	33,3%
Health and wellbeing	13%-18%	Indoor environment quality	16%	Indoor environment	33,3%
Transport	7%-9%	Location and transport	16%		
Land use and ecology	10%-13%	Sustainable site	11%		
Waste	7%-9%	Water	11%		
Management	9%-11%	Regional priority (additional)	4%		

Innovation (additional)	10%	Innovation (additional)	5%		
		LEED accredited personnel (additional)	1%		

6.5 Standardization on eligibility criteria:

The issuers expressed mixed opinion towards a standardization of eligibility criteria. However, the general sentiment was that increased standardization of information is good as it favors transparency while there is little demand for actual standards on what counts as green. The issuers positive to some standardization of the information provided in the framework (GS; VA; FA; NK; SF; SA; RH), cited prevention of greenwashing (VA; GS; SA) and better transparency for investors as primary reasons (FA; VA; SF; NK; RH). One issuer asserted that a standardization of the market would increase investors' willingness to pay for the greenium (SF). At the same time, some interviewees advocated to keep the definition of what counts as green open as the market is still growing (MS2; NK; RH; ST; ÖH; GS). Jacob Bruzelius from Rikshem said that an open definition of green promotes innovation and growth of the green bonds market. With transparent information, it is up to the investors to judge whether the framework is green enough for them (RH).

Furthermore, investors do generally not express any opinions regarding the content of the eligibility criteria (AT; FA; GS; LK1; NK; SF; SK; ST; VA). Issuers put forward two reasons for the lack of interest. As there is limited supply of green bonds, investors have little room to demand high standards (LK1; FA). Moreover, most investors lack knowledge of specific standards and tend to be satisfied with a second opinion approved green bond framework (ST; VA; AT; LK1; FA). Nevertheless, some issuers pointed out that this is changing and that investors are showing increasing interest over the past few years (SA; VA; FA).

6.6 Impact reporting

In line with the fourth principle of the Green Bond Principles, all Swedish issuers have committed report on the environmental impact of their green bond funded assets. This reporting brings transparency as investors and the public can follow how the issuers live up to their commitments. However as there is no standardized format for reporting a host of different indicators are used by issuers.

All issuers that refer to certification schemes in their eligibility criteria include the level of certification of their various projects as an indicator. There is a large variety of energy and carbon dioxide indicators with issuers using multiple indicators in parallel. As the issuers use different metrics such as total use, use per square meter and total reduced use to compare energy use and GHG emissions direct comparison between issuers is hard. Indicators on energy use is completely lacking in 13% of the cases while the corresponding number for CO2 emissions is 54%. Furthermore, the CO2 emissions that are accounted for only includes emissions generated from production of energy for the building's operation and does not include upstream emissions. Furthermore, it is not always clear if the energy use declared is accounting for total energy use in the building, including tenants' energy consumption or the indicators solely covers heating and electricity use in common areas. A more streamlined reporting including both energy use and CO2 emissions with common definitions, baselines and indicators would increase transparency, making it easier for investors to assess the impact of their investments.

Key performance indicators in impact reporting

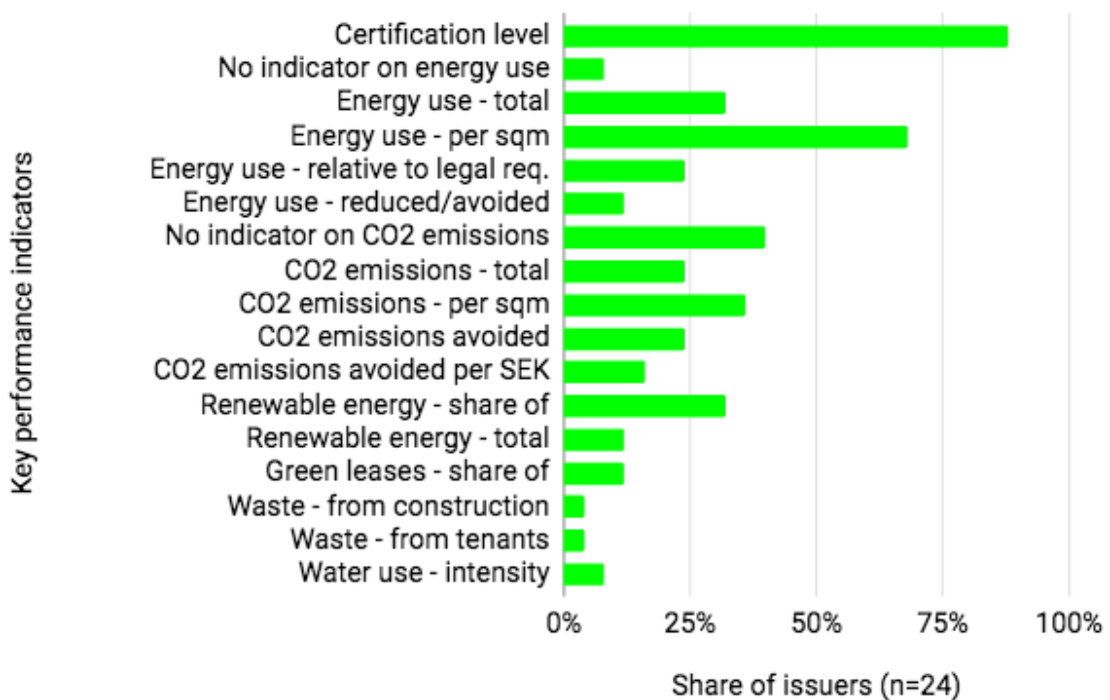


Figure 7: Key performance indicators included in investors letters, impact reports or referred to in green bond frameworks or second opinions (Own illustration, 2018).

There been recent efforts to achieve a more standardized format for impact reporting. A position paper signed by ten public sector issuers has put forward a set of key performance

indicators to be used along with a methodology including relevant baselines. Nevertheless, this report does not address the current neglect of upstream CO2 emissions. In regards to green buildings, the report focused solely on monitoring and reporting on energy efficiency and energy sources and does not mention the climate impact of materials and energy use during primary construction and renovations (Nordic Public Sector Issuers, 2017).

6.7 Standardization of impact reporting

Most issuers interviewed were positive to increased standardization of impact reporting as this would increase transparency and comparability (AT, NK, SF, SA, SK, ST, VA, FO, MS2). However, this needs to be balanced against the administrative burden of reporting (GS, SK, MS2, AT). As pointed out by Joakim Wernersson from SKB, it is “important to find a balance between the need to communicate interesting information to investors and the administrative burden, you cannot write a book every time you report” (SK). This view is shared by Magnus Borelius from the City of Gothenburg: “reporting should be comparable but not too complicated. The easiest thing to do is to kill a market by regulation, if the price advantage disappears and there are too many rules and demands for impact reporting the market will die instantly”. Moreover, many issuers prefer to keep some flexibility in impact reporting to capture different sorts of information (LK1, SA, FO, ÖH, SK). Erika Wranegård at Öhman points out that while standardization improves comparability, there is a danger in limiting reporting to certain indicators at this point, as we do not know exactly what to measure to reach the SDG’s.

6.8 Analysis: Lacking transparency in regard to upstream emissions and low comparability of impact reporting

Two major issues has been identified in the above results. First, there is lacking transparency in regards to upstream or embodied GHG emissions of green bond financed projects both in the eligibility criteria and in regards to impact reporting. Although and increased inclusion of upstream emissions in eligibility criteria and impact reporting is beneficial for the overall transparency of GHG emissions, this has to be weighed against the extra costs associated with additional reporting. Second, the wide variety of metrics used in impact reporting makes comparison of the environmental impact hard. In standardizing reporting there might however be a risk of hampering innovation and missing important factors.

According to economic labeling theory, increased standardization of information will benefit consumers, or investors in our case, as it allows for cross product comparison (Teisl and Roe, 2005, p. 68). Furthermore, standardization is predicted to benefit high-end producers, or issuers, as the quality of their product will be easier to identify (Teisl and Roe, 2005, p. 69). Voluntary reporting on the other hand allows the producer to single out positive indicators and omit indicators showing negative results (Amel-Zadeh & Serafeim, 2017). In light of this, it seems reasonable for investors to demand further standardization and increased transparency. However, the explanations for lack of standardization and transparency in regard to upstream emissions can be found in the structure of the green bond market and the dual quality of environmental impact and risk.

Increased demands on transparency in eligibility criteria and impact reporting bring extra costs to issuers whilst at the same time ensuring a better insight into the GHG emissions from the green bonds funded projects. According to Moschini, Menapace and Pick, costly labeling may distort markets, pushing high quality good producers out of the labeled market depriving them of a price advantage while incurring costs on the actors remaining in the labeled high quality sector (2008). The allocation of the cost associated with certification is according to Fulton and Giannakas dependent on the ability of the producer to charge a higher price for the high quality product (2004).

In the case of green bonds, this ability is very limited as demand is highly elastic meaning that the quantity demanded is very responsive to differences in price. Despite structural oversubscription when the green bond is issued at the same risk adjusted price as a conventional bond, the issuer can at best derive a marginal price difference (OECD, 2017b). The high elasticity of the price of green bonds stems from its dual quality. On the one hand, many investors want to increase the environmental impact of their portfolio, hence the high demand. On the other hand, as actors on financial markets where the core quality is risk adjusted return, investors have little room to pay extra for the desired impact. The lack of interest from investors in the eligibility criteria mentioned might be a result of their inability to reward issuers for the additional impact. This means that extra costs associated with green bonds may have to be carried by the issuer. Considering this, any improvements in transparency must be cost-efficient as it otherwise threatens to deter actors from entering the market or might compel actors to leave.

In addition to explaining the low ability of investors to demand increased standardization and transparency, the dual quality can help shed light on the prioritization of energy efficiency over embodied emissions in the eligibility criteria in the Swedish construction and real estate sector. Generally speaking, energy efficiency is in itself a good investment, indicating an improvement of the core quality risk adjusted return, while constructing buildings low in upstream emissions creates extra costs for issuers. According to an extensive report by McKinsey, improving energy efficiency in buildings is the most efficient GHG abatement policy as it is economically beneficial in itself (2009). The issuer Vasakronan reported that they now save SEK 200 million yearly due to recent energy efficiency improvements (Dagens Industri, 2018). At the same time, building with low carbon materials is associated with extra costs (Giesekam, Barrett & Taylor 2016). Although the extra costs for addressing these emissions can be included in the price through providing top certified buildings to sustainability minded consumers as discussed below, this be part of the explanation on the general emphasis on energy efficiency.

A further aspect that may contribute to the focus on energy efficiency over embodied emissions is expectations of coming regulations. In its newly adopted climate law, the Swedish government has committed to decreasing domestic GHG emissions by 85% by 2045 (Swedish government, 2017). This makes future policies furthering energy efficiency such as increased energy tax or subsidies for energy efficiency improvements likely (SOU, 2017 p. 282). In contrast, the GHG emissions embodied in the material of the building is to a large extent imported and is thus not included in the national goals (Boverket, 2018). This may make regulations addressing these emissions less likely.

7 Part II: Costs and benefits of green bonds

In this section, I examine the costs and benefits of green bonds to issuers and explore the possible impact this might have on their activities. In the first subsection, I review previous findings on the topic and analyze the costs and benefits reported by 17 interviewees representing 13 issuers. The issuers were made up of four municipalities and nine private actors. In the following subsection I move on to analyze to what extent the issuing of green bonds have created environmental additionality.

7.1 Literature review on the costs and benefits of green bonds

Several financial benefits for issuers have been listed in the green bond literature. The most widely cited benefit of green bonds is that it attracts new investors and thus allows the issuer to have a more diverse investor base (SOU, 2017; OECD, 2017b; Johannesson & Stejmar). A broader investor base provides long-term security in the issuers' capitalization process (OECD, 2017b). An internationalization of the investor base increases protection to fluctuations in demand for bonds in national bond markets (Massa & Žaldokas, 2014). Another benefit often cited is that there exists a green bond premium or "greenium" meaning that issuers gain access to slightly cheaper capital compared to when issuing a non-green bond. The evidence in regard to the greenium is mixed, with the majority of studies citing a slight price advantage for green bonds². These indications of a premium on green bonds go against the notion of flat pricing where the pricing of green bonds should be in line with the issuers normal bonds as the investor is exposed to the same risk and would therefore require the same return on the investment (OECD, 2017b). Strong demand from investors coupled with an undersupply of green bonds is assumed to cause the greenium (OECD, 2017b; Zerbib, 2016; Preclaw & Baksi, 2015).

There are however risks associated with labeling a bond green as an issuer may suffer reputational damage in case it fails to follow its green bond framework (OECD, 2017b; Reed, Sunderland and Clark, 2018). Extra costs connected to green bonds include the in house work drawing up the framework, selecting projects, monitoring and reporting to investors as well as costs for external reviews and a certification. (Johannesson & Stejmar, 2015; OECD 2017b, SOU, 2017). These costs are however small compared to the amount of capital raised through the issuance of the green bonds (SOU, 2017 p.11). According to Ehlers and Packer, a greenium of 1-4 basis point would be sufficient to earn back extra costs connected to issuance of green bonds already the first year (2017).

Next to the financial implications, the green bonds have also been reported to bring the operational and organizational benefits. The process of reporting and accounting may bring

² According to a study by Preclaw and Baksi (2015), there is a 17 basis points, equivalent of 0,17%, difference on the secondary market which is due to high demand. Similar findings were made in two studies by Zerbib who found a 4-9 basis point difference (2016) and Ehlers and Packer finding an average of 18 basis point in difference with a larger premium found for riskier bonds (2017). A study by the Climate Bond Initiative reported that a greenium existed in some segments of the market while others, such as European corporate bonds, priced in line with non-green bonds (CBI, 2017e).

positive side effects in terms of improved communication and information sharing in the issuer's organization (Clapp, Alfsen, Francke, Lund & Pillay 2016). These benefits are however not thoroughly researched but rests on anecdotal evidence cited in grey literature (SOU, 2017).

7.2 Main motivations to issue green bonds

Two reasons were frequently cited as main motivations to issue green bonds. First, showcasing ambitious sustainability commitments was stated as a primary reason by the majority of the interviewed actors. This was primarily done to attract new investors (AT; FA; FO; GS; MS2; NK; RH; SA; VA; ST; LK1; SK). Moreover, a majority of the municipalities interviewed pointed out that the green bonds could be used to communicate their sustainability work in a wider context beyond investors (MS2, LK1, GS). Secondly, issuers stated that financing themselves through green bonds was seen as a natural step in their sustainability work, mainstreaming green thinking throughout the organization (AT; FO; LK1; NK; SA; SK; VA). Issuers referred to this as "making the whole stream green" (AT); sustainability permeating the whole process (FO); "get the red line running through the whole organization" (LK1); "make the whole chain complete (NK); "put in another green link" (SA) and "thinking green every step of the chain" (SK).

7.3 Financial implications

Five benefits relating to finance were identified during the interviews: broadening the investor base, closer dialogue with investors, marginally cheaper access to capital, the issuance of green bonds established contacts providing access to beneficial green loans, and finally, a lower overall risk profile of the issuer.

Attracting new investors was widely cited as the greatest financial benefit in issuing green bonds (AT; FA; FO; GS; MS2; SA; ST; VA; NK). One issuer reported an increase from two investors normally buying their conventional bonds to ten to fifteen investors buying their green bond (ST). A study conducted by FA found that 50% of their investors were buying their bonds because they were green and would not have invested in the company's conventional bonds (FA). Clase Ramel from the City of Malmö saw the following advantages of a broader investor base: "The diversification of investors gives us an increased security since it provides us with new channels with different maturities and other currencies (MS2). In addition to attracting new investors, the green bonds create a closer dialogue with the

investors (GS; RH; MS2; VA; AT). This increased communication creates trust, which is likely to be beneficial for future investments (MS2).

A third financial benefit issuers experience is a slightly cheaper access to capital. Out of the 13 issuers, 11 estimated that they had received a premium on their green bonds (AT; FA; GS; LK1; MS2; RH; SF; SA; SK; ST; VA) while two of the issuers had not seen any price advantage of their green bonds compared to their conventional bonds (FO; NK). Although any definite verdict is impossible due to the changing conditions on capital markets, estimates of the premium ranged between two and seven basis points. This corresponds to 0.02-0.07% lower interest rate. The greenium was however invariably seen as bonus and none of the issuers cited this as a major motivation to issue green bonds.

Table 4: Premium estimated by issuers of their green bonds compared to conventional bonds

AT	FA	FO	GS	LK1	MS2	NK	RH	SF	SA	SK	ST	VA
2-7	5	0	“small”	2-3	5-6	0	“marginal”	“small”	2-4	“a few”	2	0-5

Furthermore, one respondent stated that the work with green bonds helped establish contacts with creditors that provided access to financially advantageous green loans. Thomas Nystedt from Vasakronan, stated that the green bonds paved the way for green loans with very favorable conditions from the European Investment Bank and the Nordic Investment Bank (VA2).

Lastly, many issuers pointed out that by issuing green bonds they might improve the overall risk assessment of the actor (MS2, GS, FA, VA, ST). This would produce reduced costs of raising capital through loans and conventional bonds as well. This is confirmed by fund manager Erika Wranegård at Öhman: “issuers are usually very far in their sustainability work, and that risk mitigation is usually not valued or considered in financial markets. So they signal that they might give a better risk-adjusted return” (ÖH).

7.4 Organizational benefits

Most issuers report that the work with green bonds has produced positive side effects within the organization. These include increased cross-departmental communication, more systematic and rigorous monitoring and better overview over “green” assets.

All issuers reported that the work with green bonds has increased communication between different parts of the organization. Half of the issuers reported that this has had, or is likely to have a positive impact on their operations and sustainability work in the future (AT, FO, MS1, NK, VA, SK, MS2). Clase Ramel from the City of Malmö explains: “It has created new nodes of information and communication. The city of x has 26.000 employees, which is a lot of companies and administrations. In this cooperation across units new dynamics and new contacts are created, it is not that they have not known each other before but now there is a closer cooperation. This can have a long-term effect on the city’s environmental program” (MS2). Joakim Wernersson from SKB stated that the work with the green bonds has had internal networking effects where people work less in silos (SK). Along the same lines, FO thinks that it has created a better understanding for the work of different departments and has improved the operations of the company (FO). The other half of the issuers state that this increased communication has had little or unclear impact their sustainability work (FA, GS, LK1, RH, SA, ST). ST and SA believe that it has rather created a better understanding of financial matters in other parts of the organization .

Another aspect of the work with green bonds reported by the issuers is the increased transparency that the impact reporting brings (MS2; GS; SA; VA; RH; NK). Although the data going into the report is generally already available in the organization, the summarizing of the data combined with a stricter review from external auditors brings added value. Johanna Moberg from Norrköping municipality elaborates: “We would not have done the monitoring in the same way; you get a more comprehensive perspective. You get more insight into specific projects. Our companies would have done this follow up anyway but this is another type of synthesis with new people involved” (NK1). Jacob Bruzelius from Rikshem asserts, “a benefit with green bonds is that you get extra control over the sustainability work and related KPI’s (key performance indicators). I would say that we follow the energy savings in our projects more closely now than if we would not have had the green bonds” (RH). Lastly, Andreas Anderholm Pedersen from the City of Malmö believes that the process of selecting projects to finance with the green bonds have given him a better overview over the city’s green assets.

The merits from increased cross-departmental communication is well founded in organizational theory. Increased cross-departmental communication tends to break down silos and increase the general effectiveness and knowledge sharing of organizations (Sosa et

al., 2015). Working in silos tends to create situations where functions of certain departments are put higher on the agenda than an overarching goal of an organization, which creates sub-optimal outcomes for the organization (Dell, 2005). Cross-sectoral stable platforms Fosters long term commitment to common goals (Forsten-Astikainen, Hurmelinna-Laukkanen, Lämsä, Heilmann, & Hyrkäs, 2017). Through fostering increased cross-departmental cooperation and a dissemination of sustainability values across the organization, the green bonds provide a stable although infrequent platform through which members of different departments meet and cooperate towards a the common goal.

7.5 Costs and risks

There was wide agreement among the issuers that additional costs in connection to the issuances are small in the context of bonds. The main costs stem from the administrative burden connected to setting up the framework and the additional reporting required (AT; MS2; SF; SA; SK; ST; GS; NK; VA). Furthermore, many issuers reported that the external reviews had been paid for by the bank underwriting the bond (FO; ST; AT; NK; SF). Lastly, some issuers referred to the reputational risk of not meeting the criteria set out in the framework as an additional risk (AT; VA).

8 Part III: The impact of green bonds: Mainstreaming sustainability and environmental additionality

Overall, the findings indicate that the green bonds' material impact on the financed projects is very limited. There are however indications that the work with green bonds might influence issuers' long term sustainability strategy. Furthermore, commitments to stakeholders and external auditing gives a sharper focus in the day-to-day sustainability work.

All issuers stated that the green bonds did not enable them to finance new projects as they could have financed these projects through a non-labeled bond as well (AT, FA, FO, GS, LK1, NK, NK1, RH, SA, ST, SK & VA). Similarly, the green bonds seem to have had no, or very small, impact on the environmental standards to which the green bond financed projects were built. Rather than having their green bond framework guiding the issuers in what standards to build to, the eligibility criteria set out in the frameworks were decided in relation to already existing sustainability guidelines and ambitions. Issuers generally express that it is

their already ambitious sustainability work that led them to also “greenify” the last link, which was finance. Albert Olofsson from Atrium Ljungberg puts it aptly: “We see ourselves as a sustainable company and work with sustainability issues. As an extra spice we can use our certified property to finance our operations in a green way”

Ten of the issuers stated that their work with green bonds had not affected their decisions on what environmental standards or energy efficiency requirements they used in the green bond financed projects (FA, AT, FO, GS, LK1, MS1, RH, SA, ST & SF). Åsa Lind from Fabège: “I’m under the impression that we would have had an equally ambitious sustainability agenda without the green bonds” (FA). Annette Henriksson from Lund municipality reasoned along the same lines: “I don’t think that we choose to do something due to the green bonds, it is rather due to our general sustainability thinking.” She went on to explain that the municipality is not intending to increase the environmental ambition level of projects to the extent that this would increase the price: “we have agreed that green bonds are not supposed to make anything more expensive (LK1)”.

However, two issuers gave a tentatively positive answer to the added environmental value of green bonds (SK, VA). Joakim Wernersson from SKB believes that the work with the green bonds has had an impact on their sustainability work and might have contributed to higher environmental standards in some projects: “I think it has had an effect, (...) there is a start-up phase but as you go along you get a more holistic thinking and a completely different drive in the sustainability work” (SK). Thomas Bystedt from Vasakronan expressed a similar sentiment: “we would have built the buildings anyway but I think that they become slightly greener because we have started with this. We set higher goals and we promise something to an external stakeholder, and auditors are involved. So you boost the sustainability work (VA1)”. Finally, two of these issuers expressed that the eligibility criteria set out in the framework might act as a guide for future projects (MS2, NK).

Furthermore, issuers report that making commitments to external parties has brought additional attention to reaching the set our sustainability goals (RH, VA, MS2, GS). Anna Denell from Vasakronan explains: “There is a sharpness in what we do. It is not just an internal goal to reach LEED platinum but now this is a commitment and something that must be met “(VA1). Correspondingly, Magnus Borelius from City of Gothenburg asserts that: “There are a lot more (employees) that focus on our sustainability work since we have

committed through our financing, and then we have to deliver, and it that way you get a tighter focus, you have to behave” (GS).

Lastly, in discussing the limited impact of green bonds on issuers’ activities, two issuers put forward the idea that the sustainability gain might be higher for issuers with a less developed sustainability work. Thomas Nystedt from Vasakronan believes the prospect of issuing green bonds can incentivize actors that do not yet have sufficiently high green standards to develop their sustainability work in order to issue green bonds (VA2). Claes Ramel from the City of Malmö made a similar statement proposing that the green bonds could be of great benefit for actors who wanted to develop their sustainability focus (MS2).

Table 5: Summary of key findings (Own illustration, 2016)

Part I: Greenhouse gas emissions of green bond financed buildings in Sweden	
Eligibility criteria	
Lacking criteria regarding GHG emissions stemming from materials and construction	40%
Non-environmental factors can play a decisive role in certification schemes	-
Impact reporting	
The wide variety of indicators used makes comparison difficult	-
Lacking indicators regarding GHG emissions	54%
Lacking quantitative indicators to communicate upstream GHG emissions	100%
Part II: Costs and benefits of green bonds	
Financial benefits	
Broader investor base	100%
Improved communication with investors	38%
Greenium – 3.5 basis points on average (0.035%).	85%
Green bonds key to access favorable green loans	8%
Lowers the risk profile of the issuing entity	38%
Organizational benefits	
Improved monitoring	54%
Improved overview of “sustainable projects”	8%
Improved communication between departments	46%
Costs and risks	
Reputational risk from not meeting the conditions in the green bond framework	16%
Costs associated with reporting and issuance of the bond relatively small	100%
Part III: The impact of green bonds: Effects on sustainability work and environmental additionality	
Enabling/incentivizing construction of additional projects	0%
Enabling/incentivizing higher environmental standards in funded projects	16%
Green bond frameworks might guide environmental standards in future projects	16%
Incentivizing sharper focus in day to day sustainability work	24%

9 Discussion

9.1 Balancing costs and transparency: the use of life cycle analysis

Starting with the first concern raised regarding the environmental integrity of the green bond financed projects I found mixed results. As seen from the above analysis, with 72% of the actors allowing renovations without considering upstream emissions, 40% allowing construction of new and existing buildings without considerations of upstream emissions and finally 46% lacking minimum energy efficiency requirements, there are blind spots and loopholes in the eligibility criteria employed. It is important to note that this does not necessarily mean that the actual buildings financed through the green bonds are not low in their greenhouse gas emissions, rather that this is not ensured by many of the current frameworks. This could partly be addressed through including both certification and minimum energy efficiency requirements as done by 36% of the issuers. There are however shortcomings to this approach. First, these certification schemes allow non-environmental factors to play a decisive role and do not include important emissions sources such as energy used during construction. Second, certification is expensive and would create additional costs for some issuers. For some issuers, especially the ones focusing on commercial properties, certification is integral to their business operations (FA, VA). However, for issuers with a different customer base, as for example municipal housing companies, the certification would not necessarily create additional value (MS2, GS, LK1). As the structure of the green bond market is likely to shift additional costs associated with monitoring and reporting onto issuers, any solution to the transparency issue must be cost effective.

A possible way to navigate the balance between extra costs and transparency of GHG emissions would be to make increasing use of life cycle analysis frameworks. A study conducted by Boverket found that life cycle analyses are perceived to be complicated and time consuming by industry actors (Boverket, 2015, p 24). However, the extra burden might not be high due to coming regulations regarding the use of life cycle analysis of buildings' GHG emissions (Boverket, 2018b). The proposal of a compulsory "climate declaration" of buildings has been put forward and is expected to come into force 2021 (SKL, 2018). However, in adopting a life cycle analysis approach, it is important that international life cycle analysis standards are used in order to facilitate international adoption and comparison.

Beyond a more complete accounting of the full life cycle GHG emissions of the green bond financed buildings, there should still be space for flexibility and innovation in impact reporting, as it does not account for all desirable qualities in a green building. Measures to further climate adaptation and biodiversity would naturally have to be reported in other ways. Moreover, some mitigating strategies such as facilitating access to sustainable transport would fall outside the scope of a life cycle analysis of the building itself. A reporting with some standardized indicators regarding the full life cycle combined with flexible indicators and qualitative description would thus strike a balance between standardization and innovation.

9.2 What difference does it make?

The findings indicate that the material impact of the green bonds is very limited and that they have not contributed to an increase in investments into low carbon infrastructure. Only two issuers reported that the work with green bonds might have had an impact on their ambition level in regards to environmental standards of their projects. Instead, issuers of green bonds tend to set the standards in their green bond frameworks according to their current strategy rather than being incentivized or enabled by benefits derived from the green label to decrease their GHG emissions. This seems to suggest that the concerns raised by Shishlov, Morel and Cochran regarding the lack of tangible benefits are well founded. As such, the high hopes from the European Union, the UNDP and the Swedish government of green bonds contributing to a significant scaling up of green investments seem to be somewhat unfounded based on the findings from this specific case.

It might however be that financial benefits show in the longer run. As issuers pointed out, the great advantage of a broader investor base lies in better access to capital in times of weak credit markets. Moreover, the benefit of issuing green bonds might be greater for actors with a less developed sustainability work. Current issuers tend to be in the forefront in regards to sustainability strategies. Seven out of the nine municipalities that have issued green bonds are ranked in the top 10% of Swedish municipalities regarding their sustainability work (Aktuell Hållbarhet, 2017). In addition, the two first corporate issuers in Sweden, Vasakronan and Skanska, were ranked most sustainable property company and most sustainable construction company in Sweden respectively (Sustainable Brand Index, 2017). As the market is still in its inception, it might be that these actors are first to move in

to derive benefits associated with green bonds while actors in the sector lacking these standards are working to catch up partly motivated by these benefits.

Furthermore, despite the tepid response in regard to direct environmental additionality and the scaling up of investment, green bonds seem to have an overall positive environmental impact. Costs are relatively low and are generally compensated for by the premium in interest rates. Green bonds can help issuers to mainstream sustainability thinking throughout the organization, increases communication and provide issuers with better overview over their sustainability work. The impact of these effects is hard to measure but should not be neglected.

9.3 Scaling up investment: Risk, return and impact.

As seen from the above analysis, the green label can help to address the asymmetrical information gap through signaling a lower risk-profile of bond issuers. Furthermore, they can be a tool for sustainably minded investors to maximize the environmental impact of their investments. However, low-carbon infrastructure is currently associated with additional costs compared to carbon intensive alternatives (OECD 2018; International Energy Agency 2014). This gap does to a large extent stem from the undervaluation of natural capital. According to a study by Trucost, the annual externalized costs from GHG emissions is over 3 trillion USD (2013). At the same time, global fossil fuel subsidies were estimated to 5.3 trillion USD in 2015, corresponding to 6.5% of global GDP (Coady, Parry, Sears and Shang, 2017). A combined approach of cutting subsidies and putting a price on carbon would change the incentive structure and make low carbon alternatives competitive on a risk-return basis (Della Croce, Kaminker & Stewart, 2011; Coady, Parry, Sears and Shang, 2017).

This logic of pricing carbon is inversed in a recent Swedish policy proposal aimed to scale up investments in green bonds. The policy called “pay per performance” change the incentives to invest in green bonds by the state making a per unit payment for GHG reductions resulting from green bond financed projects. The idea is that by adding some public capital and tweaking the pay-off structure, large amounts of private capital can be attracted (SOU, 2017 p. 269).

Next to making the investments competitive on a risk-return basis, the third dimension of impact could be introduced as a decisive investment criterion. This could be done for

publicly managed funds or by private investors who are willing to give up return or increase risk for the benefit of impact. Sovereign wealth funds have gained special attention in this respect as they usually have a great extent of strategic flexibility and do not have short or medium term liabilities (Castree and Christophers, 2015). Norway and Australia have adopted the extra-economic criteria respecting commitments to global justice and not making investments harming future generations respectively in their sovereign wealth funds (Castree and Christophers, 2015). Similarly, Zadek has proposed inserting green investment criteria in public pension funds as a “nuclear option” to steer needed resources towards low-carbon investments on a greater scale (Zadek, 2017). To singlehandedly insert these impact criteria is however a quite controversial idea as the costs in terms of lower return and higher risks would be carried by the principals of the funds. Furthermore, the problems of what counts as “impact” and how to quantify and balance the impact against risk and return would need further specification for asset managers guidance.

Another potential way to increase considerations of “impact” pension funds is to use principals’ preferences as guidance for investments. A proposal along these lines has been put forward by Blackburn who proposed that tax benefits enjoyed by UK pension funds would be tied to their compliance with a set of principles including social and ecological audits of investments and greater involvement in investment decisions by principals (Blackburn, 1999). Blackburn’s proposal was echoed by the European Commission’s High Level Expert Group on Sustainable Finance. The group recommended that pension funds should survey their beneficiaries sustainability preferences and incorporate the results in their investment strategy while at the same time increasing their integration of ESG factors in both reporting and investment (European Commission, 2018, p.75). Evidence of increased interest in extra-economic considerations by individual investors³ suggest that incorporating

³ When Swedish private investors were surveyed in their saving habits 24% answered that they invest in sustainable portfolios out of which 12% were motivated by higher returns and 48% and 29% were motivated by having a positive impact and avoiding investing in “unethical” companies respectively (TNS Sifo, 2016). A study asking Dutch households of the investment preferences found that 60% would accept a lower return on investments that countered climate change or social inequality (De Nederlandsche Bank, 2017). In the US, 67% of millennials see their investment decisions as a way to express their social, political and environmental values compared to only 34% of people above 69 years according to a study by the U.S trust conducted in 2014 (Dhar & Fetherson, 2014). Furthermore, An international survey covering 22 countries found that 70% of retail investors considers social and environmental issues important in their investment decisions (European Commission, 2018, p. 27).

their preferences would lead to a higher prioritization of ESG factors in investment decisions.

The green bond label naturally constitutes a tool to facilitate these investments as it provides institutional and individual investors alike with an overview over the use of their investments. As impact reporting becomes more standardized and granular, impact seeking investors could maximize the environmental impact of their capital through more accurate comparisons. Nevertheless, departing from the strict logic of risk-adjusted return in financial market does however have limited potential. The relocation of capital not motivated by risk and return but by other values will quickly be replaced as assets will get undervalued and start generating a higher dividend in relation to the associated risk (SOU, 2017, p 37).

10 Conclusion

In this study, I have addressed the question: How can green bonds facilitate a transition to a low carbon economy? The interviewed issuers reported a set of benefits. Financial benefits such as broadening their investor base and strengthening communication with investors increase issuer's long-term ability to raise funds on capital market. Moreover, issuers experienced improved conditions in two ways. First, a majority estimated a premium on their green bonds compared to their conventional bonds, on average 0.035%. Second, about half of the issuers reported that the work with green bonds might improve the overall risk profile of the issuing entity. Furthermore, the work with green bonds tend to bring operational benefits to issuers through strengthened monitoring and communication within the organization. The costs associated with the issuance of the bonds were generally seen as negligible in the context. Considering the benefits cited above, there seem to be few reasons for issuers with a qualifying asset base not to issue green bonds.

However, the material impact on the green bond funded projects is very limited. All issuers reported that they could have raised the needed capital to very similar rates through conventional bonds. Furthermore, ten out of twelve issuers stated that the issuance of green bonds has not influenced the environmental standards in the financed projects while two issuers gave a tentatively positive answer. Lastly, two issuers reported that the work with green bonds might influence the environmental standards of future projects. These findings seem to confirm concerns that green bonds do not provide incentives that are

tangible enough to significantly scale up green investment. Rather than directing additional capital to green buildings, it seems as green bonds is primarily a way for entities with a green profile to get a green stamp on their finances.

It should however be taken into account that the market is still in its early stages and material effects from mainstreaming sustainability through an issuers organizations might only show in the long run as. Moreover, the documented benefits may compel issuers with less developed sustainability strategies to enter the green bond market, which might bring a higher degree of environmental additionality. This aspect could be further researched looking at potential issuers and their attitude towards entering the green bond market.

Regarding the environmental integrity of the green bond financed projects there are considerable blind spots in the eligibility criteria. From a lifecycle perspective, upstream GHG emissions stemming from production of materials and the construction of buildings tend to exceed downstream GHG emissions stemming from the operations of a building in the Swedish construction and real estate sector (Boverket, 2018b). Yet, 40% of the issuers allowed for projects to be financed without any criteria beyond energy efficiency in the operations of the building while the remaining 60% relied on green certification schemes where the materials used were part of a weighted score. Furthermore, upstream emissions were widely neglected in impact reporting. Although the financed projects may be built to environmental standards higher than the ones specified in the eligibility criteria this raises concerns over their environmental integrity.

This issue could be addressed using life cycle analysis in both reporting and eligibility criteria. However, using labelling theory and mapping the structure of the market, I showed that issuers have little incentive to do this, as they have to carry the extra costs while not being able to harvest additional benefits. While data on energy efficiency is already being gathered, a calculation including upstream emissions would require additional work. Moreover, addressing the operations of buildings is generally cost effective whilst lowering the GHG emissions in construction and using less carbon intensive materials is associated with extra costs. As investors generally show little interest in eligibility criteria and impact reporting alike and green bonds tend to be oversubscribed, issuers lack incentives to address these blind spots.

This pinpoints the limitations of green bonds in funding a transition to a low carbon infrastructure. They can only be useful to issuers in so far as they address the asymmetrical information and signals a lower or at least neutral risk profile. As soon as extra costs, such as using low carbon building materials, become part of the equation they are toothless, as investors may not compromise their risk-adjusted return. Nevertheless, there are ways to use green bonds to scale up investments. Publicly funded incentives connected to green bonds could be used as levers to attract private capital. Moreover, through significantly updating investment criteria and expanding the concept of fiduciary responsibility beyond maximizing risk adjusted return in the short run, sovereign wealth funds or pension funds could be used in tandem with green bonds to scale up green investment. The technical specificities and economic consequences of these proposals must however be further considered.

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Appendix 1 - Interview guides translated from Swedish into English

Introduction of the thesis and myself.

1. Background:

- What is your position in the company
- What has been your role in the work with green bonds?

2. General:

- What have been the factors have been decisive in your decision to issue green bonds?
- Where did the idea to issue green bonds come from?
- What have been the biggest challenges in issuing green bonds?
- Do you see any particular risks with issuing green bonds?

3. Green Bond Framework

- How did you develop your Green Bond Framework?
 - Who was responsible for this and who gave input into the process?
- How did you choose the type of standards?
- How did you choose the level of standards?
- How do you perceive the possibility of including other types of goals/standards in the green bond framework such as material use or biodiversity?
- Have you received any feedback from investors on your standards?
- Have you received any feedback from investors on the green bond framework in general?
- To what extent do you think that investors are interested in what is included in the framework and the level to which you put the standards?

4. Impact reporting

- What do you include in your impact reporting?
 - How did you choose the indicators to report?
- There have been suggestions to include CO2 emission reductions per monetary unit in the impact reporting. What do you think about this suggestion?
- Have you, as a consequence of your impact reporting, did new measurements or collected data that would not have been collected otherwise?
- Do you get feedback from your investors on your impact reporting?
- Has the impact reporting created any added value for you as a company/municipality?

5. Economics and finance

- Have you seen any direct economic benefits from issuing the green bonds?
 - A greenium?

- Expanded investor base?
- Have you been able to raise more money?
- Lower volatility on the secondary market?
- What has the extra costs been in issuing the green bonds?
 - Impact reporting
 - Setting up the framework
 - Second opinion provider
- How do you think about these extra costs?

6. Internal communication

- How has the work with green bonds affected your internal communication?

7. External communication

- Have the green bonds been used to communicate your sustainability work?
 - How has this been done?
 - Who is the target group?
- How has the green bonds affected your communication with investors?

8. Direct impact on sustainability work

- Have you, as a consequence of the green bonds, made more or bigger green projects?
- Have you, as a consequence of the green bonds, chosen a higher standard on a current or future project?
 - Do you think that a future greenium would create incentives for issuers to improve their sustainability work?
 - Do you think that the benefits of green bonds have the potential to incentivize issuers improve their sustainability work in order to qualify for issuing green bonds?
- Has the issuance of green bonds affected your sustainability work in any other way?

9. Standards

- What do you think about the recent initiatives from the EU to create an EU-wide standard for what constitutes green?
- What aspects would you like to see included in such a standard?
 - Taxonomy of type of projects
 - Level of “greenness”. E.g. level of carbon emissions or energy efficiency
 - Standardized impact reporting

10. Certification and rating institutes

- How did you reason around your choice of second opinion provider?
- Have you had your green bonds rated by Standard and Poor or Moody’s green indices?
- Have you considered certifying your bonds with the Climate Bond Initiative certification scheme?

- Do you think that your grade/rating affects the demand and price of your green bonds?
- What role do you see for these rating institutes and certification services in the future?

11. Policies to support the green bond market

- What do you think about the suggestion to have the state pay for extra costs connected to the issuance such as second opinion services etc?
- What do you think about the suggested policy “pay for delivery” where an actor, after reporting on reduced CO2 emissions as a result of activities financed through green bonds will receive a payment that corresponds to a part of the societal gain of the reduced emissions?

12. Conclusion

- Out of all the benefits we discussed so far, which ones would you say have been the most decisive for you to issue green bonds?
- Do you have any other remarks or ideas in regard to the green bond market?